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FOR
APOLLO RANGE INSTRUMENTATION
AIRCRAFT

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STDN
NETWORK OPERATIONS PROCEDURES
FOR
APOLLO RANGE INSTRUMENTATION AIRCRAFT
REVISION 1

February 1972



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CHANGE INFORMATION

List of Effective Pages

<u>Page No.</u>	<u>Issue</u>	<u>Page No.</u>	<u>Issue</u>
Title and ii	Revision 1	5-1 thru 5-4	Revision 1
iii thru xv/xvi	Revision 1	6-1 thru 6-5/6-6	Revision 1
1-1 thru 1-22	Revision 1	7-1 thru 7-8	Revision 1
2-1 thru 2-34	Revision 1	8-1 thru 8-76	Revision 1
3-1/3-2	Revision 1	9-1 thru 9-3/9-4	Revision 1
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PREFACE

This document contains the operating procedures for the Apollo Range Instrumentation Aircraft (ARIA) in the areas of: SC voice relay; telemetry data acquisition, recording, and retransmission; communications; and the interface with the STDN and MCC. A brief description of the aircraft characteristics and equipment contained onboard with their specifications is included.

This document may be changed by Documentation Change Notices, printed page changes, or by complete revision.

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CONTENTS

<u>Section</u>	<u>Page</u>
PREFACE	iii/iv
1. ARIA SUPPORT	1-1
1.1 General	1-1
1.2 Scope	1-1
1.3 Mission Interface	1-1
1.4 Management Responsibility	1-1
1.5 ARIA Capability	1-2
1.5.1 Aircraft Description and Capability	1-2
1.5.2 Instrumentation Capabilities	1-2
1.6 ARIA Instrumentation Description	1-5
1.6.1 General	1-5
1.6.2 Voice and Telemetry Subsystem	1-7
1.6.3 Timing Subsystem	1-11
1.6.4 Communications Subsystems	1-12
1.6.5 Mission Coordinators Console	1-14
1.7 ARIA Acquisition	1-14
1.7.1 General	1-14
1.7.2 ARIA Instrumentation Almanac Format	1-19
1.7.3 ARIA Reentry Message	1-21
1.7.4 Specific Procedures	1-21
1.7.5 Flight Patterns	1-21
1.8 ARIA Voice Remoting and Handover	1-22
1.9 ARIA Release	1-22
1.9.1 General	1-22
1.9.2 Release Between Passes	1-22
1.9.3 Release at Termination of Support	1-22
2. OPERATING PROCEDURES	2-1
2.1 General	2-1
2.2 AOCC Operational Responsibilities	2-1
2.2.1 General	2-1
2.2.2 Operations and Control Group	2-1
2.2.3 Mission Support Group	2-6
2.2.4 Communications Group	2-6

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
2.3 ARIA Inflight Procedures	2-12
2.3.1 Mission Coordinator	2-12
2.3.2 System Analyst	2-16
2.3.3 Telemetry Operator	2-17
2.3.4 Voice Operator	2-18
2.3.5 Antenna Operator	2-21
2.3.6 HF Operator	2-23
2.3.7 Recording/Timing Operator	2-24
2.4 Procedures for ARIA Data Transfer	2-26
2.4.1 General	2-26
2.4.2 Flight Procedures	2-26
2.4.3 Data to be Transferred	2-28
2.4.4 VHF Data Transfer	2-28
2.4.5 S-band Data Transfer	2-29
2.4.6 ARIA Ground Station Interface Procedure	2-29
2.4.7 VAN-to-ARIA Data Transfer	2-30
3. EQUIPMENT MODIFICATIONS	3-1/3-2
3.1 General	3-1/3-2
3.2 Guidelines for ARIA Modifications	3-1/3-2
3.2.1 Approval	3-1/3-2
3.2.2 Authorization	3-1/3-2
3.2.3 Post-installation Evaluation	3-1/3-2
3.2.4 Requests for Modification	3-1/3-2
4. DOCUMENTATION	4-1
4.1 General	4-1
4.2 Test Support Instruction (TSI)	4-2
4.2.1 Purpose	4-2
4.2.2 Participants	4-2
4.2.3 Procedures	4-2
4.3 Instrumentation Support Instruction (ISI)	4-4
4.3.1 Purpose	4-4
4.3.2 Participants	4-4
4.3.3 Procedures	4-4
4.4 Support Request (SR)	4-6

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
4.4.1 Purpose	4-6
4.4.2 Participants	4-6
4.4.3 Procedures	4-6
4.5 Support Request (SR) Acknowledgement	4-7
4.5.1 Purpose	4-7
4.5.2 Participants	4-7
4.5.3 Procedures	4-7
4.6 Support Request Answer (SR ANS)	4-8
4.6.1 Purpose	4-8
4.6.2 Participants	4-8
4.6.3 Procedures	4-8
4.7 Support Request Advisory	4-9
4.7.1 Purpose	4-9
4.7.2 Participants	4-9
4.7.3 Procedures	4-9
4.8 Request for Instrumentation Clarification (RIC)	4-10
4.8.1 Purpose	4-10
4.8.2 Participants	4-10
4.8.3 Procedures	4-10
4.9 Request for Instrumentation Clarification Answer (RIC ANS) . .	4-11
4.9.1 Purpose	4-11
4.9.2 Participants	4-11
4.9.3 Procedures	4-11
4.10 Operations Message (OPN)	4-12
4.10.1 Purpose	4-12
4.10.2 Participants	4-12
4.10.3 Procedures	4-12
4.11 Documentation Change Notice (DCN)	4-13
4.11.1 Purpose	4-13
4.11.2 Participants	4-13
4.11.3 Procedures	4-13
4.12 Documentation Advisory	4-14
4.12.1 Purpose	4-14
4.12.2 Participants	4-14
4.12.3 Procedures	4-14

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
4.13 DCN Monthly Summary Report (All Documents)	4-15
4.13.1 Purpose	4-15
4.13.2 Participants	4-15
4.13.3 Procedures	4-15
4.14 Documentation Review Message	4-16
4.14.1 Purpose	4-16
4.14.2 Participants	4-16
4.14.3 Procedures	4-16
4.15 Documentation Confirmation Message	4-17
4.15.1 Purpose	4-17
4.15.2 Participants	4-17
4.15.3 Procedures	4-17
4.16 ARIA Peculiar Documentation	4-18
4.16.1 AFETR Operations Order for ARIA Support of Apollo . .	4-18
4.16.2 AFETR Range Instrumented Aircraft Communications Plan	4-18
4.16.3 Aircraft Operations Procedures	4-18
4.16.4 ARIA Simulation Handbook	4-18
5. COMMUNICATIONS	5-1
5.1 ARIA Communications	5-1
5.1.1 Aircraft Support	5-1
5.1.2 HF Communications	5-1
5.2 Primary Recovery Ship Support	5-1
5.2.1 General	5-1
5.2.2 Responsibilities	5-1
5.2.3 Procedures	5-2
5.3 TACSAT Communications	5-2
5.3.1 ARIA Real-time Telemetry Communications	5-2
5.3.2 Communications Configuration	5-3
5.3.3 Communications Procedures	5-3
5.3.4 Configurations for Spacecraft Voice Relay	5-3
6. SCHEDULING	6-1
6.1 General	6-1
6.2 Network Operations Schedule	6-2
6.3 Schedule Update Message Procedure	6-3

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
6.4 Station Schedule Request Procedures	6-4
6.5 Non-Participation Request Procedures	6-5
7. REPORTING	7-1
7.1 Problem Reporting	7-1
7.1.1 Purpose	7-1
7.1.2 Participants	7-1
7.1.3 Procedures	7-1
7.2 Radio Frequency Interference (RFI) Reporting	7-2
7.2.1 Purpose	7-2
7.2.2 Participants	7-2
7.2.3 Procedures	7-2
7.2.4 Station RFI Reporting	7-2
7.3 Station Postmission Report (MMR)	7-3
7.3.1 Purpose	7-3
7.3.2 Participants	7-3
7.3.3 Procedures	7-3
7.4 AOCC Equipment Status Report (ESR)	7-4
7.4.1 Purpose	7-4
7.4.2 Participants	7-4
7.4.3 Procedures	7-4
7.5 Adverse Weather Reporting	7-5
7.5.1 Purpose	7-6
7.5.2 Participants	7-6
7.5.3 Procedures	7-6
7.6 Postlaunch Composite Radio Frequency Change Reporting	7-7
7.6.1 Purpose	7-7
7.6.2 Participants	7-7
7.6.3 Procedures	7-7
7.7 AOCC Manning Status Notification	7-8
7.7.1 Purpose	7-8
7.7.2 Participants	7-8
7.7.3 Procedures	7-8
8. TEI TYPE MESSAGE FORMATS AND PROCEDURES	8-1
8.1 General	8-1
8.1.1 Teletype Message Preparation Procedures	8-1

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
8.1.2 Formatting of Teletype Messages	8-1
8.1.3 Header Information	8-1
8.1.3.1 Line 1	8-1
8.1.3.2 Line 2	8-2
8.1.3.3 Line 3	8-2
8.1.3.4 Line 4	8-2
8.1.3.5 Line 5	8-2
8.1.3.6 Line 6	8-2
8.1.4 Subject Line	8-2
8.1.5 Text	8-2
8.1.6 End of Message	8-2
8.1.7 Message Precedence Levels During Mission Isolation Periods	8-2
8.1.8 Message Precedence Levels During Nonmission Periods	8-2
8.2 Teletype Routing Indicators	8-7
8.2.1 Station Routing and Location	8-7
8.2.2 Collectives	8-11
8.2.2.1 SDI-103C-DSDC	8-11
8.2.2.2 SDI-110J-DSDJ	8-12
8.2.2.3 SDI-111K-DSDK	8-13
8.3 Teletype Message Formats	8-14
8.4 Acknowledgement Message	8-15
8.5 Data Shipment Advisory	8-16
8.6 Recorded Data Report	8-18
8.7 GSFC-originated Telemetry CRF	8-19
8.8 Station Originated Telemetry CRF Message	8-20
8.9 Interrange Vector Message (IRV)	8-21
8.10 MCC-generated Interrange Vector Message	8-22
8.11 Test Support Instruction (TSI)	8-23
8.12 Instrumentation Support Instruction (ISI)	8-25
8.13 Support Request (SR)	8-26
8.14 SR Acknowledgement Message Format	8-28
8.15 Support Request Advisory	8-29
8.16 Request for Instrumentation Clarification (RIC)	8-30
8.17 Documentation Change Notice (DCN)	8-32

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
8.18 Documentation Advisory Message	8-34
8.19 Documentation Change Notice (DCN) Monthly Summary Report	8-36
8.20 Documentation Review Message	8-37
8.21 Documentation Confirmation Message	8-39
8.22 Operations Message (OPN)	8-40
8.23 Problem Report	8-41
8.24 RFI Report	8-42
8.25 Station Postmission Report (MMR)	8-44
8.26 Adverse Weather Report	8-45
8.27 Station General Operations Schedule	8-46
8.28 Network Operations Schedule Update	8-48
8.29 Station Schedule Request	8-49
8.30 Non-participation Request	8-50
8.31 Station Manning Status	8-51
8.32 Equipment Status Report (ESR)	8-52
8.33 Countdown Status	8-55
8.34 Liftoff Message	8-56
8.35 TLI Advisory Message	8-57
8.36 Apollo Maneuver Information Message	8-59
8.37 Radiation Clearance Request	8-61
8.38 Earth Orbital Site Configuration Message (SCM)	8-62
8.39 GET Update Message	8-66
8.40 ARIA Reentry Message	8-67
8.41 Manned Mission Station/Equipment Release	8-70
8.42 Post-translunar Injection (TLI) SCM Message	8-72
8.43 Simulation Message	8-74
8.44 PAO Release Message	8-75
8.45 Mission Contingency Plan Message	8-76
9. DATA HANDLING	9-1
9.1 General	9-1
9.2 Airline Detection Devices Affecting Data Shipments	9-1
9.2.1 AOCC	9-1
9.2.2 GSFC	9-1
9.3 Data Identification	9-1

CONTENTS (cont)

<u>Section</u>	<u>Page</u>
9.4 Data Disposition	9-2
9.5 Required Teletype Reports	9-2
9.5.1 Recorded Data Report Message	9-2
9.5.2 Data Shipment Advisory Message	9-2
9.6 Station Inventory of Magnetic Tape	9-2
10. INFORMATION SYSTEM COMPUTER SUPPORT	10-1/10-2
10.1 ETR AOCC Information System	10-1/10-2
10.1.1 ARIA Orbital Acquisition	10-1/10-2
10.1.2 ARIA Reentry Acquisition	10-1/10-2
10.2 Computer Messages	10-1/10-2
10.2.1 Apollo Maneuver Information Message	10-1/10-2
10.2.2 ARIA Reentry Message	10-1/10-2

ILLUSTRATIONS

<u>Figure</u>	<u>Page</u>
1-1 Equipment Arrangement Aboard ARIA	1-3
1-2 Network Configuration for ARIA Real-time Data	1-6
1-3 ARIA Instrumentation Almanac	1-15
1-4 Flight Plan A (Infinite Selection)	1-16
1-5 Flight Plan B (Beam Tilt)	1-17
1-6 Flight Plan C (Reentry)	1-18
2-1 Location of Keyholes at Network Stations	2-32
2-2 Preferred Transfer Heading - Radial	2-33
2-3 Alternate Transfer Heading - Tangential	2-33
2-4 VHF Data Transfer	2-34
2-5 S-band Data Transfer	2-34
5-1 TACSAT Communications Configuration for Real-time TLM	5-4

CONTENTS (cont)

TABLES

<u>Table</u>	<u>Page</u>
1-1 Complement of Receiver Plugins Available per ARIA	1-7
2-1 Typical Pass-time Announcements	2-14
2-2 Maximum Data Transfer Ranges	2-27
8-1 Network Directorate Codes and Routing Indicators	8-3
9-1 Sample ARIA Data Requirements	9-3/9-4

SECTION 1. ARIA SUPPORT

1.1 GENERAL

The Apollo Range Instrumentation Aircraft (ARIA) fleet consists of four EC-135N four-engine jet aircraft which are used for Apollo support. This fleet has been developed to supplement land and marine-based stations in support of Apollo and other space and missile programs of Department of Defense (DOD) and NASA. Operating in conjunction with a worldwide surface communications network, ARIA provides two-way voice relay between the spacecraft and Mission Control Center, Houston, Texas (MCC), and receives, records, and retransmits telemetry signals from the spacecraft (SC). The aircraft are capable of rapid relocation on relatively short notice to any test support area that may be required (e.g., if injection were transferred from the Atlantic Ocean to the Pacific Ocean). The ARIA are used as follows:

- a. Lunar Mission. ARIA provide coverage of the Time Base Six (TB6) event prior to S-IVB ignition and translunar injection (TLI) burn from ignition -60 seconds to cutoff +60 seconds where coverage is not supplied by ground stations. The ARIA will be deployed to cover any launch azimuth for first or second opportunity TLI on any day of launch window within the operational constraints of the four aircraft and available bases.
- b. Earth Orbit Missions. ARIA provide coverage as designated by mission requirements.
- c. Reentry. ARIA provide coverage from Command Module/Service Module separation to spacecraft landing, excluding land station coverage.
- d. Critical Events. Critical events are supported as required.
- e. Recovery. Recovery assistance is provided as requested within the limitations of flight safety considerations.

1.2 SCOPE

The operations procedures contained in this section will be implemented when the STDN including the Aircraft Operations Section, Patrick, AFB, Fla. (call sign and acronym AOCC), is placed on mission status by Instrumentation Support Instruction (ISI) No. 001.

1.3 MISSION INTERFACE

Deployment times, records, and test support positions (TSP's) for ARIA will be provided by the Eastern Test Range (ETR) Operations Directive (OD) and the mission supplements, based upon individual mission requirements. Updated TSP's and pointing data will be provided by the AOCC as outlined in section 10 of the mission supplements. Equipment and interface testing, such as the voice relay test, will be accomplished enroute as directed by the ETR OD, Network Operations Procedure (NOP), mission supplements, and the ARIA Controller. ARIA mission support will be conducted as directed by the ETR OD, NOP, mission supplements, and the ARIA Controller.

1.4 MANAGEMENT RESPONSIBILITY

1.4.1 Operation, maintenance, and logistic support of the ARIA fleet is the responsibility of ETR; Apollo operational support requirements will be submitted by NASA to DOD Manned Space Flight Support Planning Office (DDMS) by Program Support Requirements Document (PSRD) and Flight Support Request's (FSR's). DDMS will, in turn, task ETR to provide needed support.

1.4.2 GSFC is responsible for ensuring the overall technical readiness of the STDN for missions and its operation as an integrated entity during mission periods. This responsibility includes maintenance of the ARIA fleet capability and readiness status and their integration into the STDN during mission periods. During these times, ARIA will be subject to the applicable operational support procedures contained in this NOP and the mission supplements.

1.4.3 Manned Spacecraft Center, Houston, Texas (MSC), which has the overall responsibility for manned space flight mission operations, will provide requirements for ARIA support using existing PSRD/FSR procedures. During the period from ISI No. 001 until start of the terminal count, the GSFC Network Operations Manager (NOM) will exercise operational control of the STDN including ARIA support as scheduled. During the period from the beginning of the terminal count to mission termination, MSC will exercise appropriate operational control of the STDN including ARIA support as scheduled.

1.5 ARIA CAPABILITY

1.5.1 AIRCRAFT DESCRIPTION AND CAPABILITY

The ARIA instrumentation areas are shown in figure 1-1. The nose accommodates the 7-foot parabolic instrumentation antenna. The aircraft's standard navigation/weather radar is collocated with the large antenna, but may be operated only when the instrumentation antenna is in the stow position. HF probe antennas are mounted on each wing tip and at the top of the vertical stabilizer and a 120-foot trailing wire antenna is located on the underside of the aircraft. The ARIA have the following flight characteristics and accommodations:

- a. Planned ground speed: 400 knots (speed to be used for planning mission support activities).
- b. Cruising altitude: 35,000 ft.
- c. Maximum range: 4,000 nmi.
- d. Endurance with 15,000-pound fuel reserve: 10 hours, assuming take-off from a sea level 11,000-ft runway on a standard day.
- e. Normal flight crew: aircraft commander, copilot, flight engineer, navigator and seven instrumentation operators (all-Air Force crew).
- f. Navigation systems: Doppler, Tacan, loran, and radar.
- g. Navigation accuracy in broad ocean areas: ± 12 nmi when loran is available; ± 50 nmi when loran is not available.

1.5.2 INSTRUMENTATION CAPABILITIES

1.5.2.1 General. The ARIA communications and telemetry systems have the following capabilities:

- a. Two-way voice communications with the ground via HF with the capability of accepting a Tactical Communications Satellite (TACSAT) terminal if within view of the satellite.
- b. Two-way teletype communications with ground via HF or TACSAT.
- c. Two-way communication with spacecraft from MCC when the ARIA is in the remote mode. The spacecraft voice communication is via simplex VHF (simplex A only) or duplex unified S-band (USB).

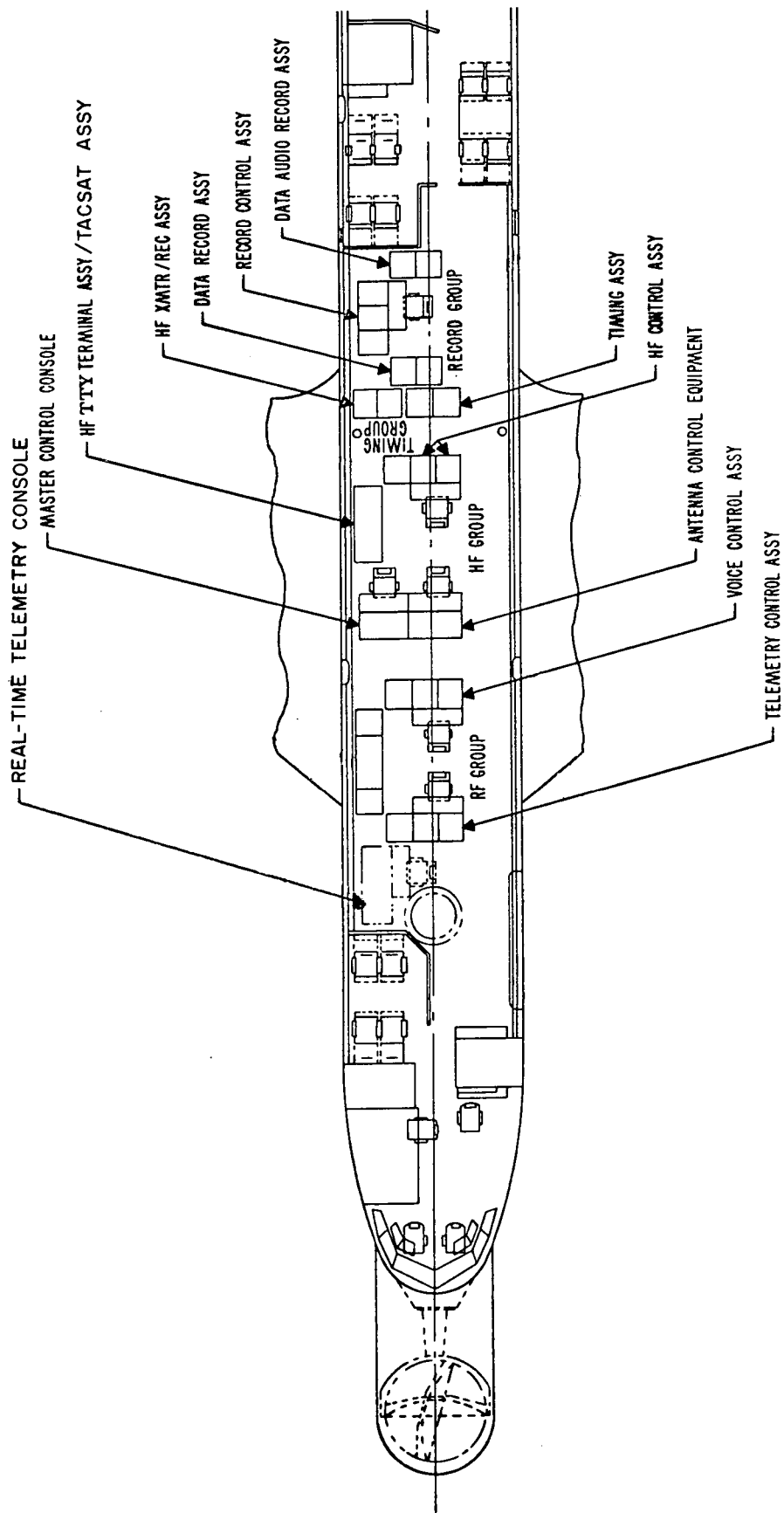


Figure 1-1. Equipment Arrangement Aboard ARIA.

- d. Reception and recording of telemetry signals via VHF and USB systems.
- e. Playback and transmission to ground of recorded telemetry signals via VHF and UHF (data transfer feature), single track each channel.
- f. Reception and recording of voice and telemetry retransmissions from ships or ground stations for rapid delivery to the data user.

Note

For the purposes of this NOP, mention of ARIA S-band UHF capabilities can be assumed to be those frequencies assigned to the USB system. Actual capabilities include frequencies used to satisfy requirements of other agencies.

1.5.2.2 Voice Communications. The ARIA is capable of receiving USB and VHF voice from the spacecraft and relaying the received voice to a ground communications terminal via HF single sideband (SSB) or TACSAT (if configured). Conversely, the aircraft can receive HF or TACSAT voice from a ground terminal and relay the voice to the spacecraft via VHF and USB. The ground-to-ARIA link can be either duplex or simplex and the ARIA-to-spacecraft link is simplex VHF and duplex USB. In addition, a simplex circuit can be established ground-to-ARIA for command and control of the ARIA.

1.5.2.3 Telemetry Capabilities

a. **Data.** The ARIA is capable of receiving and recording nine links of telemetry in the VHF and S-bands (225 to 260 MHz for VHF, and 2200 to 2300 MHz for S-band). Seven dual-channel data receivers may be arranged in any combination of telemetry assignments. The normal allocation of receiver plugins is defined in table 1-1. Left circular (horizontal), right circular (vertical), and combined polarization outputs normally are recorded from the data receivers. Two tracking receivers are usually assigned to VHF and two to S-band. No combined output is available from the tracking receivers; left circular and right circular polarization are normally recorded, left from one tracking receiver and right from the other. Telemetry modulation may be in IRIG or USB formats; however, only two USB demodulators are available for PCM/PM demodulation. One demodulator is required for each polarization sense.

b. **Data and Voice.** Reception, recording and retransmission of VHF and S-band telemetry is possible simultaneously with periods of voice relay.

c. **Delayed Data Transmission.** Transfer of telemetry data (received on VHF and S-band links) to a ground station for relay to MCC may be accomplished if there is an STDN station within range. The ARIA must be within approximately 175 miles of the station to effect a transfer. Transfer frequencies will usually be 245.3-MHz PCM/FM and 2287.5 MHz PCM/FM/PM. Data transfer at the 51.2 kb/sec/72.0 kb/sec rate requires the same time as the live spacecraft ARIA pass. One run can transfer two tracks of recorded data, one on VHF and one on S-band.

d. **Command, Metric Data, Real-time Telemetry Remoting.** ARIA has no capability at present for commanding the spacecraft or obtaining metric data.

e. **Real-time Telemetry**

(1) Through the use of DOD satellites (TACSAT in the Pacific area, LES-6 in the Atlantic area) and a Network ground station, the ARIA have a real-time telemetry capability. The system can transmit either one VHF or one USB PCM telemetry link as shown in figure 1-2.

(2) The telemetry signal is derived from the normal ARIA receivers and in order to transmit the clearest possible signal from the aircraft it is reshaped by a signal conditioner. By means of plug-in modules, either 51.2 kb/sec or 72.0 kb/sec bit rates may be conditioned.

(3) The conditioned PCM signal is used to modulate the airborne TACSAT transmitter in either one of two configurations. In Configuration 1, both the PCM data and the Astro voice modulate the transmitter simultaneously. This is done by placing the Astro voice on a 70.0-kHz VCO and mixing it with the PCM data. In configuration 2, only the PCM data modulates the transmitter.

(4) Both LES-6 and TACSAT downlink P-band frequencies (225-260 MHz) can be directly received by the STDN ground station and processed for transmission to MSC the same as any other telemetry signal.

(5) The present ARIA satellite antenna system requires that the aircraft have a look angle of greater than 30° to either the LES-6 or TACSAT to relay the data through the satellite.

1.6 ARIA INSTRUMENTATION DESCRIPTION

1.6.1 GENERAL

Three electronic subsystems and a master control console provide the instrumentation capability of the ARIA. The subsystems required for support of Apollo missions are voice and telemetry, timing, and HF.

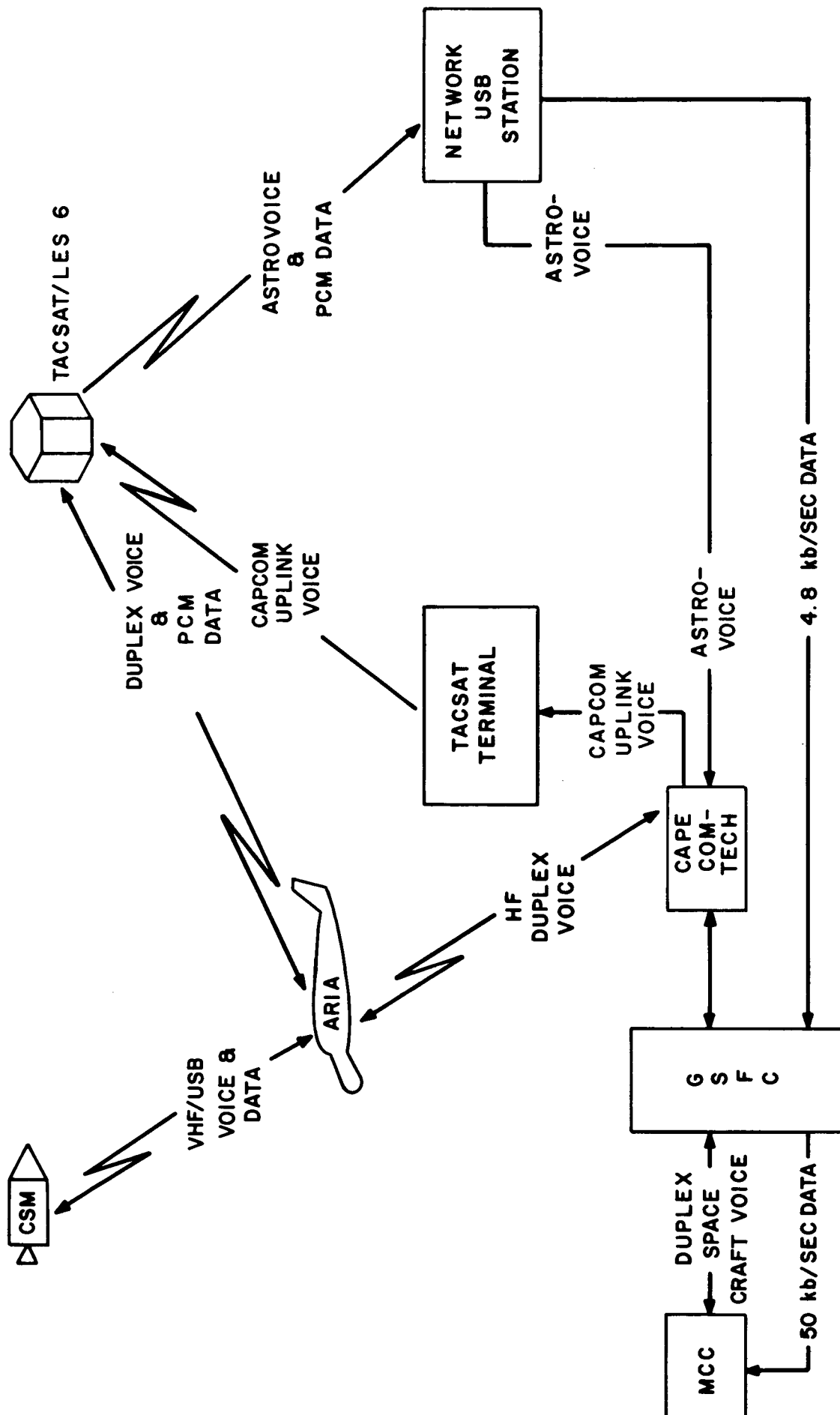


Figure 1-2. Network Configuration for ARIA Real-time Data

Table 1-1. Complement of Receiver Plugins Available Per ARIA

Plugin	Quantity
RF head 225-260 MHz	9
RF head 1435-1540 MHz	6
RF head 2200-2300 MHz	6
IF filter 10 kHz	6
IF filter 100 kHz	5
IF filter 300 kHz	5
IF filter 500 kHz	5
IF filter 750 kHz	5
IF filter 1.5 MHz	5
IF filter 3.3 MHz	3
NBFM demod 10-50 kHz IF	10
NBFM demod 100-750 kHz IF	10
WBFM demod 1-3.3 MHz IF	10
Phase demod	10
<p>Note</p> <p>This table indicates total complement available at home station. Plugin units aboard each ARIA will depend on mission configuration. All receivers require one RF head and one IF filter. One demod is required for each tracking receiver and two demods for each data receiver.</p>	

1.6.2 VOICE AND TELEMETRY SUBSYSTEM

1.6.2.1 The voice and telemetry subsystem provides the following capabilities:

- Two-way communications remoting, spacecraft/MCC via ARIA relay.
- Multichannel reception and recording of spacecraft telemetry data.
- Playback of the telemetry data to a ground station after a pass (data transfer).

1.6.2.2 These functions are performed by a steerable antenna; VHF, S-band, and HF SSB receivers and transmitters; and recording and playback equipment. This equipment is grouped as follows:

a. Antenna Group. The antenna feed is a monopulse type (instantaneous phase comparison) tracking arrangement with separate elements for VHF and S-band. The VHF elements can be configured during premission setup (before flight) to provide either horizontal and vertical or right and left circular polarization sensing. The antenna can automatically track a target in VHF or S-band. However, when both bands are being received simultaneously, S-band track will normally be used.

(1) The major electrical characteristics of the antenna and feed are:

<u>Item</u>	<u>Characteristics</u>
(a) Antenna Beam width	VHF: 40 deg approximately. UHF: (S-band) 4.7 deg.
(b) Antenna Gain	VHF: 12 dB (min). UHF: (S-band) 29 dB (min).
(c) Feed	2-channel monopulse for both UHF (S-band) and VHF.
(d) Frequencies of operation	225 to 315 MHz. 1435 to 1540 MHz. 2200 to 2300 MHz.
(e) Feed polarization	VHF: Premission selection of vertical and horizontal polarization or left and right circular polarization. UHF (S-band): Left and right circular polarization.
(f) Diplexer	VHF and S-band diplexers permit simultaneous transmission and reception of voice and telemetry signals with VHF and S-band.

(2) The major mechanical characteristics of the antenna are:

<u>Item</u>	<u>Characteristics</u>
(a) Pedestal	Two axis airborne mount, canted -35 deg from the longitudinal axis of the aircraft and mounted on the vertical plane.
(b) Angular coverage	Azimuth: ± 100 deg relative to the aircraft heading. Elevation: -30 deg to +100 deg with respect to the horizontal plane.
(c) Maximum angular velocity	Azimuth: 90 deg/sec referenced to mount axis Elevation: 24 deg/sec referenced to mount axis.

<u>Item</u>	<u>Characteristics</u>
(d) Angular acceleration (referenced to aircraft)	Elevation: 52.5 deg/sec ² . Azimuth: 180 deg/sec ² .

b. RF Equipment

(1) USB and VHF transmitters and receivers are used for communicating (Voice) with the spacecraft. The receivers also supply steering information to the tracking antenna. Additional low-power (0.5 W) data transfer UHF (S-band) and VHF transmitters, with blade-type (VHF) and S-band flush mounted antennas on the bottom of the aircraft, are provided for retransmitting recorded data to ground stations.

(2) The USB and VHF voice transmitters have essentially the same frequency and modulation characteristics as comparable equipment in the ground stations of the STDN. The characteristics of the transmitters aboard ARIA are as follows:

<u>Item</u>	<u>UHF</u>	<u>VHF</u>
(a) Modulation	USB format (FM on 30-kHz subcarrier, on S-band carrier).	AM.
(b) Frequency	2106.407 MHz for command-service module (CSM), or 2101.8 MHz for lunar module (LM).	296.8 MHz.
(c) Power Output	100 W.	100-W CW and 360-peak envelope power on sine wave modulation of 90 percent.

(3) The system noise temperature of the VHF link is approximately 1200 deg K. Provision is made for wide and narrow preamplification of the S-band signal. In the narrowband configuration, the S-band system noise temperature is approximately 1000 deg K.

(4) Provision is made for receiving standard IRIG telemetry signals as well as nonstandard telemetry signals. Telemetry receiving frequencies in the VHF band are between 225 and 260 MHz. Dual-channel receivers are provided to receive and process each of the required telemetry channels. UHF telemetry is in either of two bands: 1435 to 1540 MHz L-band (DOD requirement), or 2200 to 2300 MHz S-band (NASA and DOD requirement).

(5) Four tracking receivers arranged in VHF and S-band pairs provide steering error information to the antenna control loop. The error signal outputs of the tracking receiver pairs in each band are available for polarization-diversity selection of the best signal. A second selector on the outputs of the UHF (S-band) and VHF tracking receivers is used to select UHF (S-band) when above threshold, otherwise the VHF signal is selected. In addition, each tracking receiver pair provides telemetry outputs in two polarization senses (not combined). Pre- and post-detection outputs are available.

(6) The predetection combiner is a maximum ratio combiner. Combining control is provided from AGC during reception of AM signals and from out-of-baseband noise during reception of FM and PM signals. For FM and PM signals, high-pass filters in each receiver select the noise above the data in each channel of the receiver IF. The combiner control voltages are developed from this noise. The combining action will be severely degraded unless the correct low frequency cutoff is selected for the noise filter and IF bandwidth used. Since the high-pass filter cutoff is ganged to the video low-pass cutoff, this often results in the selection of an apparently incorrect video frequency. The video cutoff frequencies required to provide optimum combining are as follows:

<u>IF</u>	<u>Video Cutoff</u>
10 kHz	6.25 kHz
30 kHz	6.25 kHz
50 kHz	12.5 kHz
100 kHz	25 kHz
300 kHz	50 kHz
500 kHz	100 kHz
750 kHz	250 kHz
1.0 MHz	400 kHz
1.5 MHz	400 or 750 kHz
3.3 MHz	1 MHz

(7) Each ARIA has two USB Signal Data Demodulators (SDD) which detect PCM data on a 1.024-MHz subcarrier and voice data on a 1.25-MHz subcarrier. The PCM video wavetrain output of the SDD's is normally recorded on FM record amplifiers. This is necessary to avoid a dynamic dc level shift, which would occur if the data were recorded directly on the tape, with the resultant loss of the dc and low-frequency components of the wavetrain.

c. Data Transfer. The spacecraft telemetry data recorded on ARIA may be transferred to the ground stations via the UHF (S-band) and VHF data transfer facilities. The equipment used for this function consists of two transmitters, one VHF and one S-band. The modulation characteristics of the transmitters will usually be the same as the spacecraft downlink (VHF 245.3 MHz and S-band 2287.5 MHz), but the USB format is not used. The radiated power output of each transmitter is nominally 0.5 W.

d. Recording Equipment

(1) The recording equipment on the ARIA is used to store signals for later analysis and/or transfer to ground station. The ARIA are equipped with two M-28 1-in., 14-track wideband instrumentation tape recorders which are compatible with the standard STDN M-22 and VR-3600 recorders. Four tracks of one recorder and two of the others are assigned to the FM record amplifiers which facilitate recording of USB PCM data and the multiplexed data including timing, signal strength, annotation, etc. The remaining 10 tracks of one recorder and 12 of the other are normally assigned to four telemetry links,

recording the two individual polarization senses and the combined polarization on separate tracks. The basic specifications for the instrumentation recorders are as follows:

(a) Number of tracks: 14.

(b) Frequency response at available tape speeds:

<u>Speed</u>	<u>Record Frequency Response</u>	<u>Playback Frequency Response</u>	<u>Running Time (Approx)</u>
120 in./sec	400 Hz to 1.5 MHz	5 kHz to 1.5 MHz	15 min
60 in./sec	400 Hz to 750 kHz	5 kHz to 750 kHz	30 min

(c) Record modes: Direct or FM. Seven FM record amplifiers are available for each aircraft. Two FM record amplifiers have been permanently assigned to tracks 7 and 8 of each recorder because of the long setup time required.

(d) Reel Size: Either 10.5 inches or 14 inches.

(e) Tape: 1.0 or 1.5 Mil; 1-inch wide.

(f) Reference Frequency Generator: A reference frequency generator is provided, permitting the recording of any selected frequency on any combination of tracks. Only one frequency can be selected at a time. The following reference frequencies are available: 12.5 kHz, 25.0 kHz, 100.0 kHz and 200 kHz.

(g) Multiplexers (MUX): There are two MUX's aboard each ARIA. Each has a complement of IRIG subcarrier oscillators (SCO's), channels 1 through 18 and A through E. The outputs of these channels may be summed by each of the two MUX's on board.

(2) The ARIA are equipped with one 7-track audio recorder which is used to record remoted voice communication received from the spacecraft and the ground station, as well as ARIA intercommunications, voice annotation, and time signals. The basis specifications of the audio recorder are:

(a) Number of tracks: 7.

(b) Tape speeds: 1-7/8, 3-3/4, 7-1/2, and 15 in./sec.

(c) Reel size: 10.5 x 1/2 inch.

(d) Record time: 6-1/2 hours at 1-7/8 in./sec (normal speed).

1.6.3 TIMING SUBSYSTEM

1.6.3.1 The timing subsystem is the central timing facility for the ARIA electronics system. Its primary function is to generate time codes and precision repetition rates or frequencies for correlation of recorded and transmitted data. In addition, it provides displays of standard time (GMT) and mission countdown/elapsed time.

1.6.3.2 Time codes available are IRIG A, B, C, D, and E; AMR G-1 and G-3; NASA 28- and 36-bit; and Mercury (NASA).

1.6.3.3 The source of all timing signals is the rubidium primary frequency standard (PFS). The basic output frequency is 100 kHz. A precision crystal oscillator serves as backup to the rubidium frequency standard. A WWV receiver is provided for timing standard synchronization. The system can be synchronized to time of year information from WWV or WWVH to ± 5 milliseconds.

1.6.3.4 Three types of input power are used in the timing subsystem: primary ac power, switched ac power, and emergency battery power. Critical circuits are supplied from batteries and operate when ac power is absent. One of the battery supplies is located within the timing system group and allows the system to maintain synchronization while being transported.

1.6.3.5 The time codes most commonly recorded with the data on the ARIA instrumentation and voice recorder are IRIG C (2 p/sec) and IRIG B (100 p/sec) amplitude modulated on a 1-kHz carrier. These timing signals are multiplexed on a standard IRIG proportional bandwidth subcarrier.

1.6.4 COMMUNICATIONS SUBSYSTEMS

1.6.4.1 ARIA Communication Interface. The ARIA communications subsystems are interfaced with the ARIA worldwide communications network which is described in detail in sections 1 and 8 of the mission supplements. The ARIA communications network is activated at F-10 days. Certain GSFC and local circuits supporting the AOCC may be activated at an earlier day. The onboard communications subsystems involve two functional areas: the instrumentation section Prime Mission Electronic Equipment (PMEE) and the flight deck.

a. PMEE Area. The PMEE area provides the following communications capabilities:

- (1) Direct voice contact between ARIA and the spacecraft via VHF and USB.
- (2) Direct voice and teletype contact between ARIA and ground via HF SSB or voice via TACSAT.
- (3) Voice relay between the spacecraft and the ground terminal; between ARIA and the ground terminal via HF or TACSAT, and between ARIA and the spacecraft via VHF and USB.
- (4) Voice relay during recovery operations.

b. Aircraft Flight Deck. The aircraft flight deck equipment will be used by the aircraft commander for flight clearance and aircraft operations traffic. This equipment includes the following communications equipment:

- (1) Two HF SSB transceivers.
- (2) Two VHF transceivers (100-156 MHz).
- (3) Two UHF transceivers (225-399 MHz).

1.6.4.2 Ground Support System. The ground support system consists of an AOCC and the ARIA worldwide network.

a. AOCC. The AOCC is equipped with voice and teletype circuits which interface with the STDN, the ARIA worldwide communications network, Federal Aviation Agency (FAA), and local support agencies.

b. Worldwide ARIA Communications Network. The ARIA communications network consists of two sectors: the Atlantic/Indian Ocean sector and the Pacific Ocean sector.

(1) The Atlantic/Indian sector consists of Cape Kennedy (sector control); Antigua; Ascension; and Mahe.

(2) The Pacific sector consists of Wheeler AFB, Hawaii (sector control); Vandenberg AFB, Calif; Sydney, Australia; and Guam.

c. Ground Station Capabilities. ARIA ground station capability includes:

(1) Two-way HF voice communications with the ARIA for spacecraft voice relay and interface with STDN via DOD/NASA point-to-point circuits.

(2) Two-way HF voice communications with the flight deck of the ARIA.

(3) Two-way teletype support to ARIA.

d. DOD/STDN Interface. Cape Kennedy Air Force Station (CKAFS) ETR Station 1 is the overall ARIA network control station and is the interface with the STDN for ARIA spacecraft voice relay.

1.6.4.3 HF Communications Subsystem. The HF communications subsystem provides voice and teletype communications between the ARIA and ground stations. The HF subsystem relays spacecraft voice transmission to a ground facility over HF radio and receives voice transmission from a ground facility for relay to the spacecraft via VHF and/or S-band. It also transmits and receives teletype and voice to and from ground stations via HF link for administrative purposes. This provides coordination among all instrumentation systems during specified prepass, pass, and postpass activities, including handover and voice remoting control. Voice transmission from MCC is controlled by voice operated relay (VOX) and tone keying.

a. General. The HF communications subsystem is a compound full-duplex voice and teletype radio system made up of three transmitters and three receivers and associated equipment. Voice capability includes amplitude modulation and single or independent sideband and suppressed carrier. Teletype operation normally uses separate receivers and transmitters from voice, but either may be switched to an unused sideband of the other. Features include high-sensitivity receivers with low inherent noise and 1000-watt transmitter power. Operating frequency range is from 2.0 to 29.999 MHz which, with 0.1 kHz channel spacing, provides 280,000 channels. Independent sideband capability and self-contained multiplexing of as many as four audio inputs is also available.

b. Receivers. The HF receiving facilities receive voice transmissions from ground or surface stations, either directed to ARIA or for relay to a manned spacecraft, and teletype transmission directed to ARIA. Normal operating mode is single sideband. Three receivers are used, configured to provide frequency diversity plus standby channels. This is possible due to the receivers' capability for independent sideband operation with voice on one sideband and teletype on the other. One antenna normally serves all the receivers.

c. Transmitters. The HF transmitting equipment enables ARIA operators to originate messages to the ground station and provide spacecraft to ground radio-to-radio relaying of voice communication originating in the spacecraft. Three active transmitters (HF3, HF4, HF5) are provided. Each active transmitter feeds an antenna. The three antennas are provided as a part of the aircraft subsystem. They consist of a trailing wire and two wing-mounted probe antennas.

d. Audio Control Equipment. The audio control unit, used with associated equipment, provides individual squelch enable and disable controls of HF and spacecraft receivers. The squelch distinguishes between noise and normal modulation of the receiver audio circuit. Squelch control network bypass is provided by using the pushbutton switches in the audio matrix switching units. The control-indicators are part of the audio matrix switching function. They enable interphone-to-radio switching (audio, microphone, and control lines) between the aircraft interphone stations and PMEE HF radios, and radio-to-radio relaying between HF and spacecraft radios. The control indicators have squelch and audio-visual indications. Pushbutton switch control is provided to select half-duplex or full-duplex operation.

e. Teletype. The teletype equipment provides simplex, duplex, or half-duplex transmission and reception of teletype messages. It is used in conjunction with other HF equipment to provide administrative and coordinative communication. For incoming messages, the functions include conversion from frequency-shift keyed (FSK) tone format to multiple level teletype signals and then to printed page or punched type format. Outgoing messages may be originated directly by keyboard or from pre-punched tape. The teletype equipment converts this input to FSK tone format for transmission via the HF communications circuits.

1.6.5 MISSION COORDINATOR'S CONSOLE

1.6.5.1 The mission coordinator's console is used to monitor the status and operation of all onboard subsystems, and to initiate instructions for the PMEE crew. The signals received from other subsystems regarding status and operations generally illuminate light indicators. However, digital indicators are used to display GMT and countdown, or ground elapsed time. In addition, meter-type indicators provide antenna azimuth and elevation information.

1.6.5.2 The console provides private intercom facilities between the Mission Coordinator (MC) and each ARIA equipment operator, pilot, and navigator. A common net including all positions (designated PMEE-IC) and selected conference loops are also provided.

1.6.5.3 Signals from the PMEE subsystems indicate when any transmitter is radiating, any receiver is receiving a signal, and any recorder is in the record or playback mode. Failure indications are provided for each subsystem. Each subsystem is represented by a GO/NO-GO indicator which is manually activated by the subsystem operator at the completion of his inflight checks. Additional signals from the antenna subsystem indicate manual or autotrack modes and LOS.

1.6.5.4 Miscellaneous control functions provided at the master control console are:

- a. Pushbutton indicators which direct the recording operator to start and stop magnetic tape recorders in the record mode and in the playback mode.
- b. Pushbutton switches to start and stop the countdown/elapsed time clock.

1.7 ARIA ACQUISITION

1.7.1 GENERAL

1.7.1.1 For each mission, nominal pointing data for the ARIA is provided in the premission ARIA Instrumentation Almanac (see figure 1-3). The almanac allows each ARIA to fly the data run patterns illustrated in figures 1-4, 1-5, and 1-6, as required. A complete almanac will be onboard each ARIA to allow aircraft changes by the AOCC if the assigned aircraft aborts.

ARIA INSTRUMENTATION ALMANAC

T.S.P. 01.003.BL.072. 04/11/70 10DEG 39MIN S 136DEG 46MIN E

PLAN	G.M.T.	G.E.T.	EVENT	TRACK
B	23.15.20	004.02.30	S1	226
	23.19.56	004.07.06	E1	
	23.20.44	004.07.53	PCA	78
	23.21.59	004.09.09	S2	

G.E.T	AZIMUTH (MAG)	ELEVATION	RANGE	AZ SECT	NO SWEEPS	XTRMT DOPPLER	REC DOPPLER
004.04.30	225	-2	969	3	2	.3472	57
004.05.00	223	0	846	5	3	.3458	59
004.05.30	221	2	719			.3446	60
004.06.00	219	6	591	6	3	.3439	61
004.06.08	16 BT	7					
004.06.25	11 BT	10					
004.06.30	214	10	462			.3445	60
004.06.43	00 BT	14					
004.07.00	205	18	338			.3492	55
004.07.30	183	31	237			.3674	35
004.07.53	146	41	207			.4019	-2
004.08.00	133	41	211			.4134	-15
004.08.30	93	31	291			.4506	-55
004.09.00	77	22	427			.4648	-70
004.09.30	70	16	582			.4690	-75
004.09.49	11 BT	14					
004.10.00	66	13	743	5	3	.4706	-77
004.10.30	63	10	907			.4712	-77
004.10.40	16 BT	10					
004.11.00	62	9	1071	3	2	.4713	-77
004.11.30	60	7	1235			.4712	-77
004.11.59	00 BT	6					
004.12.00	60	6	1399	2	2	.4709	-77
004.12.30	59	5	1562			.4706	-77
004.13.00	58	4	1724			.4702	-76
004.13.30	58	3	1886			.4697	-76

MAGNETIC VARIATION = -4.45

08.36.54 GMT DAY = 66

Figure 1-3. ARIA Instrumentation Almanac

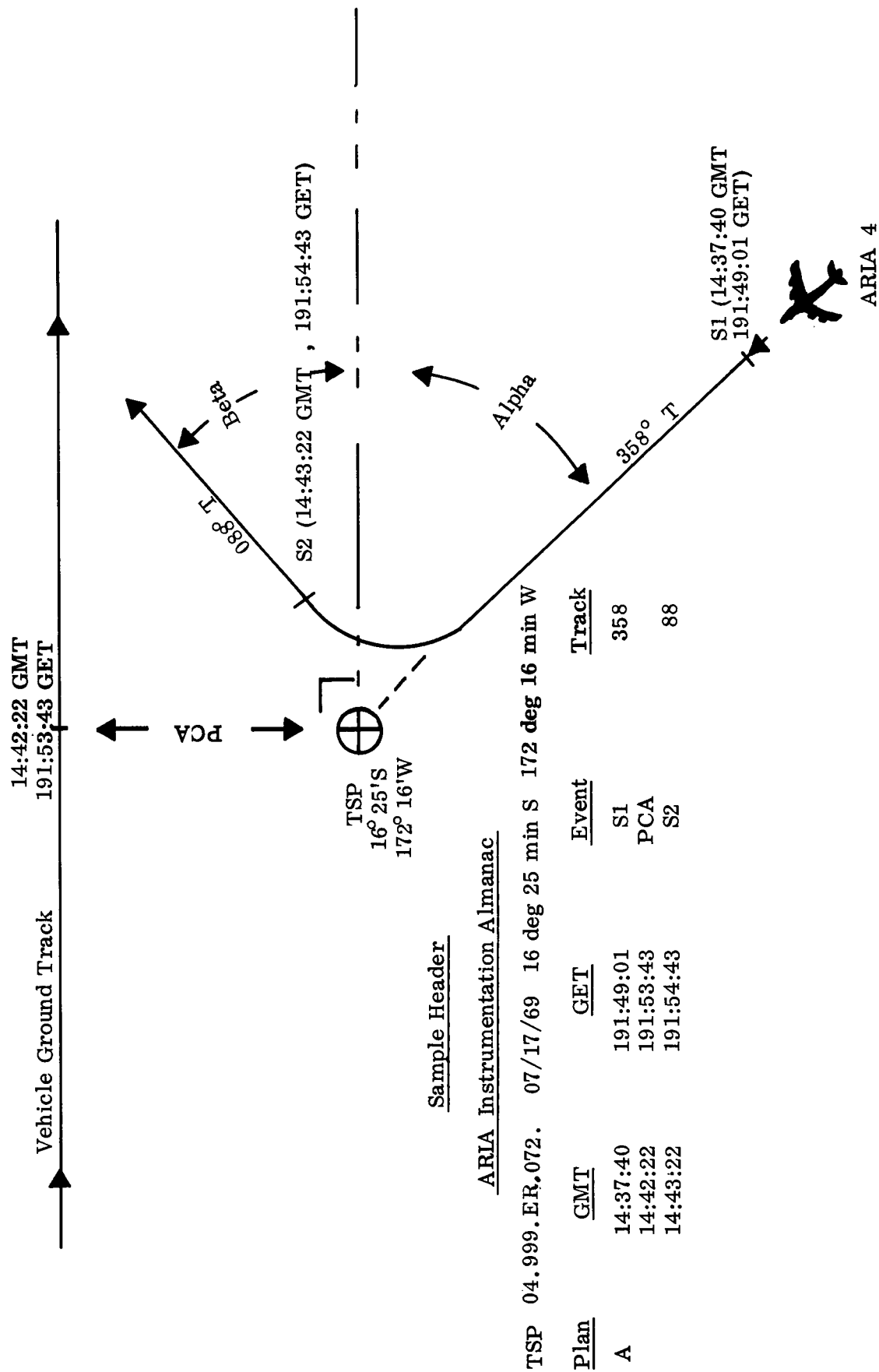
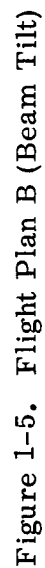
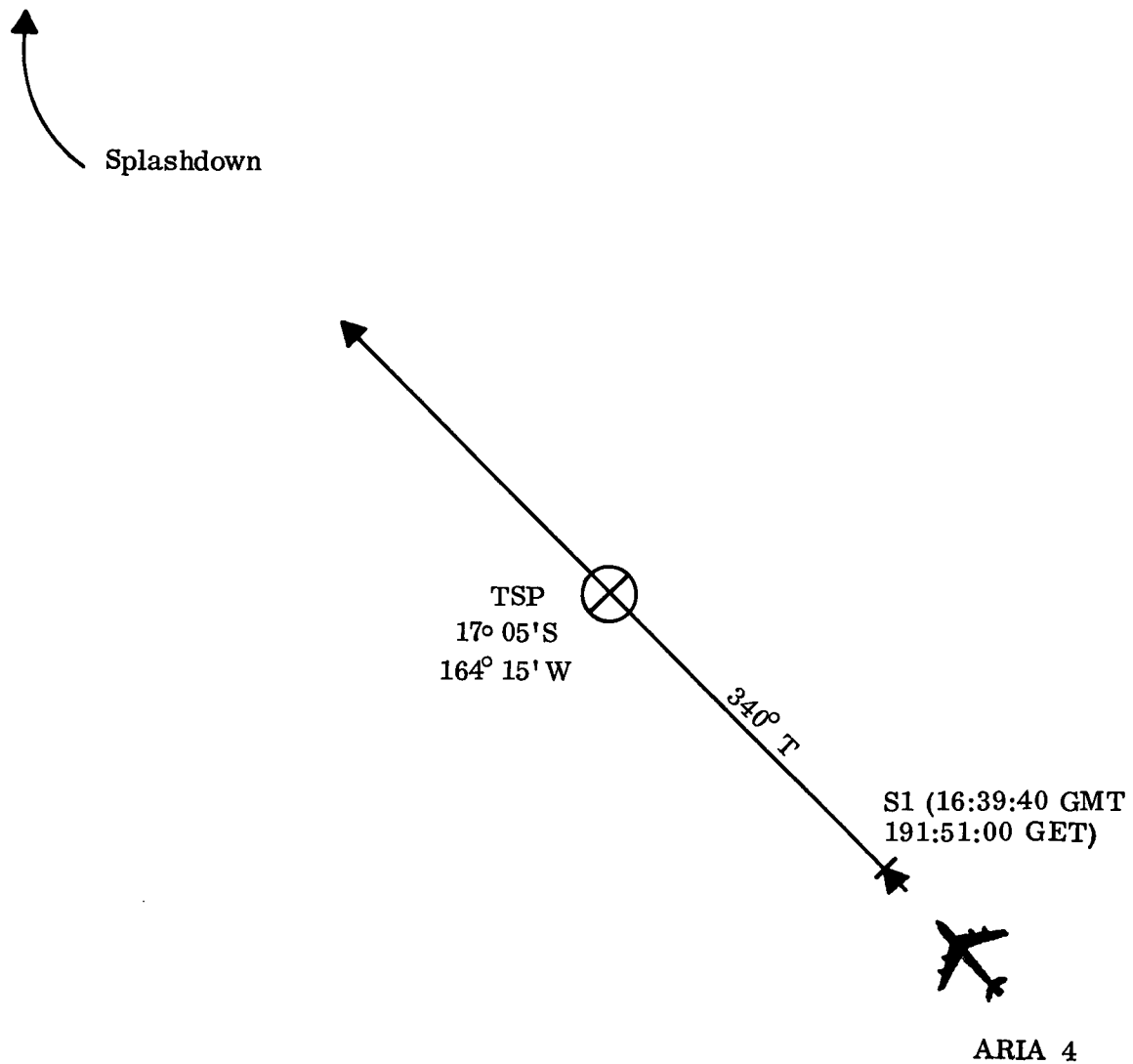


Figure 1-4. Flight Plan A (Infinite Selection)





Sample Header

ARIA Instrumentation Almanac

TSP	04.999	GR.072.	07/17/69	17 deg 05 min S	164 deg 15 min W
<u>Plan</u>	<u>GMT</u>	<u>GET</u>	<u>Event</u>	<u>Track</u>	
C	16:39:40	191:51:00	S1	340	
	16:47:40	191:59:00	TSP		

Figure 1-6. Flight Plan C (Reentry)

1.7.1.2 Under nominal circumstances, the premission almanac provides adequate data to enable the ARIA to acquire and track the spacecraft. However, if there is an unplanned change in trajectory, or if the ARIA is unable to reach its assigned TSP, real-time updated acquisition will be provided by the AOCC-IS (Information System).

1.7.1.3 During the orbital, translunar injection, and reentry phase of the mission, the AOCC-IS will generate and update the ARIA Instrumentation Almanac as required. The updated acquisition messages (almanacs) will be transmitted to the AOCC via TTY circuits. The AOCC will relay the messages via TTY or voice to the ARIA, as required, by H-24 minutes. The AOCC will keep the Network Controller (NC) and Network Operations Manager (NOM) informed when it is necessary to move to a new TSP, in real time.

1.7.2 ARIA INSTRUMENTATION ALMANAC FORMAT

1.7.2.1 The header of each ARIA Instrumentation Almanac generated by the AOCC-IS will contain a TSP identification, support date (referenced to GMT), and the TSP location (latitude and longitude) in degrees and minutes. The flight plan code will also be included. An example of the ARIA test support position identification is as follows:

TSP: 1.002.BL.072.U

- a. The first digit (1.) refers to the assigned ARIA number (1 through 4).
- b. The next group (002.) refers to the spacecraft revolution number. Reentry will read "999".
- c. The next group (BL.) identifies the TSP area. The first letter (B) refers to the TLI data coverage interval (A=Time Base Six [TB-6] event, B=S-IVB TLI ignition sequence, C=S-IVB TLI cutoff sequence [T-7]). The second letter will be either "L" or "R" to indicate that the TSP is either left or right of the ground track as viewed in the direction of spacecraft travel.

Note

Letter assignments for reentry almanacs are for ETR computer program control only. Depending on the TSP's assigned, typically E could be the CM/SM separation TSP, F the prior to blackout TSP, and G and H the two splashdown TSP's.

- d. The fourth group (072.) refers to the launch azimuth to the nearest and least whole degree (truncated whole number), i. e., 72.62 deg will read 072.
- e. The last letter (U) identifies an update: blank for premission, U for the first update, V for the second, etc.

1.7.2.2 Three basic flight plan options are available and are identified in the header as Plan A, Plan B, and Plan C. Times for S1, E1, point of closest approach (PCA), TSP and S2 events are provided in both GMT and GET. The S1 and S2 aircraft track angles to be flown are provided in degrees, true.

- a. Flight Plan A (Infinite Selection). This option (see figure 1-4) provides a turn at PCA with an infinite selection of both inbound and outbound tracks.

- (1) S1 denotes start of inbound track (2 min before horizon break).
- (2) PCA gives time for PCA of trajectory to TSP.

- (3) S2 denotes start of outbound track (1 min after PCA).

Note

The pilot will determine start of turn based on altitude, wind, and degree of turn.

b. Flight Plan B (Beam Tilt). This option (see figure 1-5) will control the flight path of the aircraft based on target elevation angles. The primary purpose of this flight plan is for beam tilt operations.

- (1) S1 denotes start of inbound track (2 minutes before horizon break).
- (2) E1 denotes time to start turn using normal bank angles for true air speed, altitude, and degrees to be turned.
- (3) PCA gives time for PCA of trajectory to TSP.
- (4) S2 denotes start of straight and level flight for the outbound track.

Note

The pilot will maintain the aircraft heading within ± 10 deg of the antenna direction from S1 to E1, and from S2 to LOS.

c. Flight Plan C (Reentry). This option (see figure 1-6) is used primarily during reentry operations for TSPs located downrange of splashdown and provides a single track through the TSP.

- (1) S1 denotes start of straight and level flight for the inbound track (2 min before horizon break).
- (2) TSP denotes time the aircraft will fly over the TSP.

1.7.2.3 The ARIA Instrumentation Almanac contains the following look-angle information in 30-sec increments:

- a. GET in hours, minutes, and seconds.
- b. Azimuth relative to magnetic north.
- c. Elevation angle relative to the aircraft.
- d. Range in nmi.
- e. Azimuth sector.
- f. Number of sweeps.
- g. ARIA transmitter Doppler correction.
- h. ARIA receiver Doppler correction.

Note

The almanac will also contain the look-angle information for the precise time of PCA.

- i. Beam tilt schedule referenced to PCA (\pm).
- j. Magnetic variation used.
- k. GMT and day of year almanac generated.

1.7.3 ARIA REENTRY MESSAGE

Pre-mission nominal reentry message data will be extracted from the Theoretical Trajectory Document for use in defining TSP locations and in the generation of pre-mission almanacs. A pre-mission nominal reentry message will be transmitted from MCC to the AOCC during first reentry simulation. Updated reentry messages will be sent approximately 24 hours prior to reentry for TSP planning purposes and five hours prior to reentry to facilitate AOCC-IS generation of updated acquisition messages for ARIA. The formats for these messages are given in section 8.

1.7.4 SPECIFIC PROCEDURES

1.7.4.1 General. The acquisition and tracking sequences are shown in figures 1-4, 1-5, and 1-6.

1.7.4.2 Spacecraft Angle Acquisition. ARIA will use the beam intercept method of acquisition. The antenna is to be positioned on the horizon along the expected track, in accordance with the instructions in the ARIA Instrumentation Almanac or acquisition message. Sector scan will be used when specified by the almanac. If both VHF and S-band signals are available, the tracking combiner will be operated in the VHF/UHF (S-band) OPTIMUM mode; otherwise the appropriate individual mode will be used (VHF OPTIMUM or UHF OPTIMUM).

1.7.4.3 USB RF Acquisition. The two basic modes of USB RF acquisition for ARIA are:

a. Two-way RF Lock. This will be the prime acquisition mode for active ARIA located where handover is not necessary. This is accomplished by sweeping the uplink frequency, biased for the expected Doppler shift, about the nominal spacecraft receive frequency until the SC transponder is captured. The SC transponder will then sweep with the ARIA uplink, and will sweep through the pass band of the ARIA receiver which will lock to and sweep with the downlink. At this point, two-way lock is achieved and the uplink sweep is decayed. The ARIA uplink frequency will be manually centered to its nominal value.

b. Three-way RF Acquisition. This method will be used by ARIA operating in overlap with an active station (so as not to interfere with the active station), or by an ARIA establishing acquisition prior to handover. It is achieved by sweeping the ARIA receiver about the nominal SC downlink frequency. When the receiver acquires the downlink, it will cease sweeping and will track.

1.7.4.4 Detailed Acquisition Procedures. Specific detailed procedures for antenna and USB acquisition will be found in section 2 of the mission supplements.

1.7.5 FLIGHT PATTERNS

The nominal flight patterns for the ARIA data intervals are shown in figures 1-4, 1-5, and 1-6. These patterns are the least likely to cause problems for the PMEE operators and flight crew.

1.8 ARIA VOICE REMOTING AND HANDOVER

ARIA will go into the voice remote mode and back to the local mode at the times specified by the Site Configuration Message (SCM). The ARIA ground network will be configured to support the voice remoting functions under the control of the Cape Kennedy ARIA ComTech and Goddard voice (refer to section 2).

1.9 ARIA RELEASE

1.9.1 GENERAL

During mission support the ARIA aircraft are under direct control of the AOCC at all times except when engaged in actual pass support from H-5 min to LOS +5 min. During that time, ARIA PMEE is under control of MCC.

1.9.2 RELEASE BETWEEN PASSES

Following a pass, AOCC assumes control of the ARIA in order to prepare the aircraft for its next pass (in the case of earth-orbital support). No TTY message is required from MCC or GSFC to accomplish this since it is designed to be an automatic procedure. ARIA remains responsive to MCC and GSFC during this period, but through AOCC rather than direct.

1.9.3 RELEASE AT TERMINATION OF SUPPORT

After an ARIA has completed its support commitment, the NC will transmit a release advisory message for the aircraft to the NOM. The NC will also simultaneously notify the ARIA controller at AOCC by voice that the ARIA is released. The NOM will, upon receipt of the NC's release advisory message, transmit the release message to AOCC via TTY.

SECTION 2. OPERATING PROCEDURES

2.1 GENERAL

2.1.1 This section contains typical procedures necessary to operate an ARIA in support of Apollo missions. In addition, the functions of the AOCC supporting the STDN and the ARIA during mission times are discussed and procedures are given for performing a data transfer from an ARIA to a STDN station. These procedures include those that:

- a. Outline activities for all ARIA systems operators and the MC.
- b. Provide alternate procedures for contingency operation.
- c. Provide interface for Apollo missions between the ARIA and the AOCC, the STDN stations, and MCC.

2.1.2 The procedures contained in this section are valid only for ARIA operations in support of an Apollo mission. Procedures applicable to ARIA and AOCC that do not involve support of a manned mission are found in applicable DOD documentation. When in direct support of, or when communicating with a space vehicle, these procedures correspond with those given for STDN stations in the mission supplements.

2.2 AOCC OPERATIONAL RESPONSIBILITIES

2.2.1 GENERAL

The AOCC is the focal point for operation and control of all ARIA support provided to DOD and NASA for manned spaceflight missions. AOCC communications are interconnected with GSFC, MCC, the Range Control Center at Cape Kennedy, and DOD circuits. The AOCC provides coordinated support to Apollo missions through the following groups:

- a. Operations and control group.
- b. Mission support group.
- c. Communications group.

2.2.2 OPERATIONS AND CONTROL GROUP

2.2.2.1 General. The Operations and Control Group (OCG) operates within the AOCC to provide detailed real-time control of the ARIA. The OCG consists of the ARIA Task Force Commander and ARIA Controllers.

2.2.2.2 ARIA Task Force Commander. The ARIA Task Force Commander (TFC) has the overall responsibility for mission support provided by the AOCC and the ARIA.

2.2.2.3 Senior ARIA Controller. The Senior ARIA Controller (ACON-1) is responsible to the TFC for detailed control of ARIA mission support and assumes the duties of the TFC in his absence.

- a. Operational Procedures. The ACON-1 will:

- (1) Act as AOCC interface with the GSFC Network Operations Control Center (NOCC).

and MSC MCC.

- (2) Direct ARIA utilization for optimum mission support.
- (3) Periodically inform NASA and DOD of ARIA status.
- (4) Review and forward the Site Configuration Messages (SCM's) and acquisition messages.
- (5) Maintain liaison with the NC and NOM.
- (6) Receive, review, approve, and forward daily ARIA status reports to NASA/DOD.
- (7) Notify MCC of new TSP's and times as soon as available.
- (8) Transmit to MCC by TTY the current acquisition message update, including AOS and LOS times, for all supporting aircraft at H-45 minutes, or when aircraft are updated.

b. ACON SCM Procedures

- (1) The ACON will receive and relay the SCM to the ARIA (refer to section 8 for explanation of SCM's).
 - (a) Changes to the SCM prior to H-18 minutes will be made by TTY.
 - (b) Changes to the SCM after H-18 minutes will be received at AOCC by voice from MCC on Net 2 or ARIA Coord Net.
 - (c) After H-1 minute, changes to the SCM can be made directly to the MC from MCC on ground operations support system (GOSS) Conference.
- (2) Questions and coordination on SCM's will normally be conducted with MCC Track unless they concern voice remoting, in which case they will be handled by the Houston ComTech.

c. Contingency Procedures

- (1) If the SCM is not on station by H-30 minutes, ACON will query Track on Net 2.
- (2) If ACON has not received assurance that the ARIA can be configured according to the SCM, a report to this effect will be made to MCC NC on Net 2.
- (3) MCC real-time command (RTC) or ComTech may change remoting or USB handover during pass times on GOSS Conference.
- (4) If problems that hinder the support of the ARIA are encountered, ACON will notify NC of the problem and estimated time operational (ETO) on Net 2. The ACON will also inform the NC and NOM of the problem after the pass by a status message.

d. Typical Pass Activities of the ARIA Controller (assuming SC handover between three ARIA).

Time			Personnel	Activity
ARIA 1	ARIA 2	ARIA 3		
H-40			ACON	Receive acq message. Give pass briefing on initial series and as required to each ARIA.
H-35			Cape ComTech	Voice remoting check for ARIA 1.
H-30			ARIA 1 MC ACON	Report systems status to AOCC. Receive SCM and transmit to ARIA 1.
H-24			ACON	Transmit acq message to ARIA 1.
	H-35		Cape ComTech	Voice remoting check for ARIA 2.
	H-30		ARIA 2 MC ACON	Report systems status to AOCC. Receive SCM and transmit to ARIA 2.
	H-24		ACON	Transmit acq message to ARIA 2.
		H-35	Cape ComTech	Voice remoting check for ARIA 3.
		H-30	ARIA 3 MC ACON	Report systems status to AOCC. Receive SCM and transmit to ARIA 3

Time			Personnel	Activity
ARIA 1	ARIA 2	ARIA 3		
H-11			ACON	Relay countdown to ARIA 1, 2, and 3 if required.
		H-24	ACON	Transmit acq message to ARIA 3.
H-8			ARIA 1 Pilot	Report ARIA 1 at TSP to AOCC.
H-2			ARIA 1 MC	Report carrier on/remote to AOCC.
	H-8		ARIA 2 Pilot	Report ARIA 2 at TSP to AOCC.
AOS			ACON	Monitor ARIA 1 report of AOS to MCC.
	AOS		ARIA 2 MC	ARIA 2 AOS . Hold carrier off until handover.
		H-8	ARIA 3 Pilot	Report ARIA 3 at TSP to AOCC.
H+ (SCM)			ARIA 1 MC	ARIA 1 carrier off/ local.
			ARIA 2 MC	ARIA 2 carrier on/remote. Go for remote.
LOS			ARIA 1 MC	ARIA 1 LOS .
		AOS	ARIA 3 MC	ARIA 3 AOS . Hold carrier off until handover.
	LOS		ARIA 2 MC	ARIA 2 LOS .

Time			Personnel	Activity
ARIA 1	ARIA 2	ARIA 3		
	H+ (SCM)		ARIA 2 MC	ARIA 2 carrier off/local.
			ARIA 3 MC	ARIA 3 carrier on/remote. Go for remote.
		LOS	ACON	Monitor for ARIA 3 report of LOS to MCC.
			ARIA 3 MC	ARIA 3 carrier off/local per SCM or LOS+2.
LOS+5			ARIA 1 MC	Transmit quick-look report and status. *
	LOS+5		ARIA 2 MC	Transmit quick-look report and status. *
		LOS+5	ARIA 3 MC	Transmit quick-look report and status. *
*Relayed to NC and NOM by AOCC.				

2.2.2.4 Assistant ARIA Controllers. The assistant ARIA Controllers (ACON-2 and -3) are responsible for these duties delegated to them by the Senior ARIA Controller.

a. Operational Procedures. The assistant ARIA Controllers will:

- (1) Perform duties including any or all of the duties assigned to the Senior ARIA Controller; therefore, their position functional requirements will be the same as those of ACON-1. During normal operations, ACON-2 and ACON-3 provide the interface between the AOCC and the supporting aircraft.
- (2) During 24-hour AOCC participation, assume all of the responsibilities of the Senior ARIA Controller in his absence.
- (3) During multiple handovers, will have joint responsibility with the Senior ARIA Controller.

b. Contingency Procedures. Same as Senior ARIA Controller.

2.2.3 MISSION SUPPORT GROUP

2.2.3.1 General. The ARIA Mission Support Group (MSG) provides support to ACON by informing him of mission developments and problems. The MSG will be located in the AOCC, as required by ACON. The MSG comprises the following personnel:

- a. Navigator (NAV-1).
- b. Navigator (NAV-2).
- c. Computer Advisor (Computer).
- d. Operations & Procedures Advisor (O&P).
- e. Instrumentation Advisor (Instrumentation).
- f. DOD Representative (DOD Rep).
- g. Status & Records Advisor (Status).
- h. Documentation (DOC).
- i. Access & Information Advisor (AI).

2.2.3.2 DOD Representative. The DOD Rep must have an intimate and accurate knowledge of all phases of the Apollo mission, the Apollo spacecraft systems, MSFN systems and procedures, ARIA system capabilities/limitations, and the current ARIA support plan. The DOD Rep will function in an advisory capacity on the ARIA mission planning team. Operating procedures are as follows:

- a. Contact with DOD Manager's staff in Houston will be maintained via the DOD Houston circuit, DOD Console, Houston OSBORN, and DOD Recovery.
- b. Information concerning mission status and current planning will be effected through the NOM at Goddard on ARIA Coord Loop.
- c. Access to Network Support Team (NST) advisory support is through the Goddard NOM. Particular NST positions (i.e., ARIA, Telemetry, Documentation, or Data) may be used for special telemetry instructions, data return plans, etc.

2.2.3.3 Computer Advisor. The computer advisor's responsibilities include close monitoring of the mission progress and insuring the AOCC-IS computer ephemeris is updated as required to provide acquisition data to the ARIA. The computer advisor (callsign "ARIA Computer") will coordinate receipt of required interrange vector's (IRV's), Apollo maneuver messages, and ARIA reentry messages with MCC Track on impact prediction (IP) Coord Loop and MCC Data Select on GOSS 6.

2.2.3.4 MSG Operating Procedures. The internal operating procedures for the MSG are contained in the AOCC Operating Procedures Manual.

2.2.4 COMMUNICATIONS GROUP

2.2.4.1 General. The Communications Group assists ACON by providing voice and teletype communications from the AOCC to the ARIA via the Cape ComTech and to GSFC, MSC, CKAFS, and ARIA staging bases. The Communications Group is composed of the following personnel:

- a. Ground Communications Coordinator (GCC).
- b. Teletype Operator.
- c. ARIA ComTech.

2.2.4.2 Ground Communications Coordinator. Advise the ACON on all ground communications problems. The interface with CKAFS is as follows:

- a. The ARIA network communications checks will commence at OST-2 hours.
- b. All ground operational support circuits, Nets 1 and 2 (ARIA coordination, and ComTech coordination) will be established to Goddard by the CKAFS Comm Controller.
- c. These circuits will be voice checked with GSFC Voice no later than 1 hour prior to manning the AOCC consoles.
- d. It will be the responsibility of GSFC Voice to establish circuits to the MSC, Wheeler AFB interface, local GSFC drops, and other necessary communications via NASA Communications Network (NASCOM).

2.2.4.3 Teletype Operator. The Teletype Operator (TO) will be familiar with all mission traffic that is required to support NASA/DOD missions. Teletype circuits will be checked with GSFC, CKAFS, Wheeler AFB, PAFB, and the TELEX operator by the AOCC Comm Center personnel 2 hours prior to manning AOCC consoles.

2.2.4.4 ARIA Communications Network ComTech. The ARIA communications network ComTech ensures that area facilities allotted to the ARIA communications network are tested, properly configured, and operationally ready to support the mission.

a. Operating Procedures. Operational control of the ARIA network will be exercised by the Cape Kennedy ARIA ComTech. His duties are as follows:

(1) Circuit Switching. The capability for real-time air-to-ground (A-G) voice switching is provided through the ComTech console. Any restorative circuit switching that can be affected without noticeable disruption to A-G communications may be accomplished without a resulting status report in real time. Any such circuit switching that does cause a noticeable disruption will be reported to GSFC Comm Manager, who will immediately send a status report to the MCC Comm Controller for MCC internal reporting.

(2) Remoting Procedures

(a) The Cape Kennedy ARIA ComTech will be responsible for coordinating and interfacing the voice relay through the ARIA to the STDN.

(b) The Cape Kennedy ARIA ComTech will be responsible for selecting the best available spacecraft voice signal from the Atlantic-Indian Ocean sector relayed through the ARIA for remoting to the STDN.

(c) The Wheeler ARIA ComTech will be responsible for selecting the best available spacecraft voice signal from the Pacific Ocean sector relayed through the ARIA for remoting to the Cape Kennedy ARIA ComTech upon request of the Cape Kennedy ARIA ComTech.

(d) Transmissions on ARIA primary voice relay circuit (AAG-1) will be limited to ARIA ComTechs and persons authorized by AOCC.

(e) From 15 minutes prior to predicted AOS, use of the voice relay circuit between the ARIA and Cape Kennedy will be limited to the ARIA and Cape Kennedy ARIA ComTech, except in an emergency.

(f) The Cape Kennedy ARIA ComTech will notify ACON of the status of the circuit to the ARIA immediately following the brief system check and report any changes in status through the data interval.

(g) The Cape Kennedy ARIA ComTech will notify ACON prior to committing the circuit to a spacecraft voice relay configuration.

(h) The Cape Kennedy ARIA Com Tech, in coordination with the GSFC Comm Manager (Voice Control), will determine if the quality of the voice circuit from the ARIA is acceptable for spacecraft voice relay purposes.

(i) If the primary HF relay circuit cannot be cleared of noise or interference by the automatic manual quieting circuits, manual key procedures will be implemented. After all possible fixes have been attempted, the Cape Kennedy ARIA ComTech will inform the Houston ComTech of the problem and request that CapCom use manual key voice procedures.

(j) The Cape Kennedy ARIA ComTech will notify the mission controller aboard the ARIA when voice relay circuit AAG-1 is committed to the STDN for spacecraft voice relay.

Note

The ARIA will be given talk capability at H -1 minute by Goddard Voice.

(k) At H -35 minutes the Cape Kennedy ARIA ComTech will perform a brief systems A-G remoting test with the ARIA that is scheduled to remote MCC/spacecraft voice, as follows:

1. The Cape Kennedy ARIA ComTech will transfer the receive leg of the NASCOM GSFC voice relay circuit (Net 1) to AAG-1. This will permit the aircraft technician to make volume level and voice adjustments in preparation for relay to the spacecraft. This leg will be removed after adjustments are made.

2. The voice remoting check will be according to the following script and will require 30 seconds for checks (51 seconds if repeat checks are required):

Cape ARIA ComTech "ARIA _____. This is ARIA ComTech. Are you ready for remoting checks?"

ARIA MC "Roger. ARIA _____ standing by for remoting checks."

Cape ARIA ComTech "ARIA _____. Go remote."

ARIA MC "Roger. ARIA _____ going remote."

Note

Aircraft HF operator configures ARIA to remote.

Cape ARIA ComTech "ARIA _____. ARIA ComTech testing 1-5-1.
How read and give me a short count."

ARIA MC "ARIA ComTech. This is ARIA _____ reading
you _____ (state quality of reception), 1-5-1."

Cape ARIA ComTech "ARIA _____. Go local."

Note

Aircraft HF operator configures ARIA to local.

ARIA MC "ARIA _____. Local."

Cape ARIA ComTech "ARIA _____. Report your remoting quality of
modulation and percent keying."

ARIA MC "Roger, ARIA ComTech. ARIA _____ (quality)
modulation, (percent) keying."

Cape ARIA ComTech "Roger ARIA _____. Stand by for voice
remoting."

Cape ARIA ComTech "Houston ComTech. This is ARIA ComTech.
ARIA _____ completed remoting and is go at
this time."

Houston ComTech "ARIA ComTech. This is Houston ComTech.
Roger."

Note

If the Houston ComTech requires remoting checks,
they may be performed following the same script,
substituting Houston ComTech call sign for ARIA
ComTech. The GSFC Comm Manager may perform
a voice check between H-15 minutes and H-10 minutes
with the ARIA.

(1) During each support interval having the possibility of spacecraft voice reception and during which the SCM requires no voice relay function, the Cape ARIA ComTech will have the ARIA go to a remote (downlink only) mode, and will monitor the spacecraft voice at the Cape Kennedy ARIA ComTech console. In the event that the downlink voice from ARIA is superior to that being remoted by the active station (compared with GOSS Conference), the ARIA ComTech will inform the Houston ComTech that he has good voice downlink through ARIA No. _____. The Houston ComTech has the option of using the ARIA Voice by coordinating in real-time with the ARIA ComTech and Goddard Voice. It is emphasized, however, that the purpose of the downlink remote is for exercising the ARIA and the ground network. The voice will not be sent to Goddard (or elsewhere in the STDN) unless requested by the Houston ComTech.

b. Contingency Procedures

- (1) If MCC loses tone keying capability, the MCC ComTech will direct the Cape Kennedy ARIA ComTech (via Net 2) to use manual keying procedures. If the HF ground station has lost the capability to receive tone keying, the Cape Kennedy ARIA ComTech will notify MCC ComTech (via Net 2) and institute manual keying procedures.
- (2) The ARIA ComTech will use the Coord Loop to notify the HF ground station to institute manual keying procedures. If contact cannot be established on the Coord Loop, GOSS Conference may be used.
- (3) During manual keying procedures, the Capsule Communicator (CapCom) will call the spacecraft call sign twice at the start of each transmission and say "over" at the end. The repetition of the SC call sign is a cue for the DOD ARIA ground station ComTech to manually key the HF transmitter. When the CapCom says "over," the HF ground station ComTech will release the manual key. An example of manual keying script is:

"Apollo 15, Apollo 15, Houston CapCom

-----Text-----

over."

- (4) If an active ARIA fails for any reason and a second ARIA is in a position to assume the active role, the Cape Kennedy ARIA ComTech will coordinate with MCC ComTech who will notify CapCom. If both aircraft have an operational secondary HF circuit, they will be bridged together by the Cape Kennedy ARIA ComTech. MCC (either ComTech or CapCom) will call both ARIA simultaneously, "ARIA-1, ARIA-2, -on my mark handover, 3-2-1-Mark." ARIA-1 (assuming it to have been the active aircraft) will go local and bring its S-band carrier down. ARIA-2 will go remote and bring up its S-band carrier.
- (5) In the event that the secondary HF circuit is not available, both ARIA will be bridged to GOSS conference for MCC's handover command. It is recognized that under this condition the handover command will be remotored through the active ARIA to the spacecraft.
- (6) If the HF duplex circuit becomes unusable during an active pass, the ARIA will configure the simplex net for remotoring on cue from the Cape ComTech.

2.2.4.5 All ARIA ComTechs

- a. The ground stations are responsible for assuring that the aircraft is assigned one primary and one alternate frequency at all times. If conditions preclude assignment of frequencies prior to termination of flight, the call frequencies listed in the mission frequency plan will be used.
- b. At bases where aircraft are scheduled to remain overnight and where telephone service is available to the ARIA ground communications stations, frequencies for the next leg of the flight may be coordinated with the ARIA ComTech at the ground station.
- c. Frequency coordination may also be accomplished using UHF after takeoff if arrangements have been made in advance.

2.2.4.6 Communications Management. Frequency management and protection procedures, reporting and remoting procedures, and systems and direct test procedures are in the AFETR Comm Plan.

2.2.4.7 Record Keeping

a. Logs. Logs will be kept for all ARIA missions; all times will be GMT. One copy of each log will be forwarded to the ARIA Project Communications Office (DOK), PAFB, Florida, no later than 5 days after mission termination.

b. Mandatory Recordings

(1) The Cape Kennedy ARIA ComTechs will ensure the circuit used for relay of spacecraft voice is recorded full time using VOX, starting at F-1 day. Recording speed will be 1-7/8 in./sec.

(2) Wheeler ARIA ComTech will ensure the voice relay circuit to Cape Kennedy is recorded full time using VOX, starting at F-1 day. Recording speed will be 1-7/8 in./sec.

(3) Recordings on other circuits, including the voice relay Net, will be made for historical and analytical purposes if facilities are available.

c. Disposition of Recordings. One copy of the ARIA voice relay circuits recording will be held at the recording facility. If not called for within 90 days, the tape may be reused.

2.2.4.8 Air-to-Ground Voice and Teletype Communications

a. Voice. The AOCC will interface with the ARIA A-G voice and teletype network at the Cape Kennedy ARIA ComTech console. Upon receipt of the AOCC circuit, the Cape Kennedy ARIA ComTech will provide voice communications between the AOCC and any ARIA being supported by the network.

(1) When requesting the circuit, the AOCC will specify the instrumentation area (ARIA No. ____) or the flight deck (ARIA No. ____ A).

(2) The Cape Kennedy ARIA ComTech will ensure that he has a usable voice circuit between himself and the ARIA, and then switch it to the AOCC.

b. Teletype. Upon request of the AOCC, the Cape Kennedy ARIA ComTech will establish a teletype circuit between the AOCC and the ARIA being supported by the network.

2.2.4.9 Contingency Procedures. If it appears that the aircraft has lost communication with the network ground stations on the primary mission frequency, the radio operator will request that the aircraft commander attempt to establish communication on the Aircraft Operational Control Network (AS-2). If after 15 minutes the aircraft cannot contact a ground station on this net, an attempt will be made to reestablish communication by calling on each frequency assigned for a period of 15 minutes. The frequencies used will be in accordance with the following schedule:

On the hour to +15 minutes:	Primary frequency
+15 to +30 minutes:	Alternate frequency
+30 to +45 minutes:	Primary frequency
+45 minutes to the hour :	Alternate frequency

2.3 ARIA INFLIGHT PROCEDURES

2.3.1 MISSION COORDINATOR

2.3.1.1 General. This paragraph outlines the procedures to be used by the MC for prepass, pass time, and postpass activities. These procedures include specific instructions for:

- a. ARIA mission operations.
- b. The reporting of nominal and contingency operations to AOCC and MCC, or GSFC.
- c. The ARIA communication loop procedures.

2.3.1.2 Operating and Reporting Procedures

a. General. The MC will have control of the ARIA from H-30 minutes until LOS+10 minutes, unless flight safety considerations render full mission support impossible. The MC is responsible for all mission support and equipment readiness. He will interface with AOCC and MCC; he will also act as the point of contact between the aircrew and the electronics crew.

b. Reporting to MCC. The normal MC interface with MCC is through ACON. The MC reports: "(ARIA No.) AOS," "(ARIA No.) go for remote VHF," "(ARIA No.) go for remote USB," "(ARIA No.) go for remote VHF and USB," and "(ARIA No.) LOS." The reports are made on the secondary HF Net to ACON, who relays the information to MCC on Net 2.

(1) Any activities that represent changes to the original mission plan will be coordinated with the aircraft commander.

(2) MC will keep the aircraft navigator informed of new TSP's and mission progress information as received from the AOCC.

(3) At completion of the inflight tests, calibrations, and checks, the MC will verify that the equipment is configured according to this NOP, the mission supplements, and the SCM; he will inform the AOCC of equipment status.

c. Pass Time. ARIA will turn USB carriers on and off and configure in either voice remote or local in accordance with the SCM. The MC will make the announcements listed in table 2-1 via the secondary HF Net to the AOCC.

Note

1. "AOS" denotes initial downlink RF contact with the spacecraft.

2. "GO for remote VHF or USB" is construed to mean that the MC estimates that the VHF signal strength or two-way lock on USB are solid enough to support voice relay.

3. "GO for remote VHF and USB" denotes that point-in-time when the MC estimates VHF signal strength and two-way lock on USB are both solid enough to support voice relay.

4. "LOS" denotes termination of downlink RF contact with the spacecraft.

d. Handover. Handovers involving ARIA will be at times specified in the SCM, and under normal circumstances, coordination between AOCC and ARIA is not required. ARIA pass-time calls are required as set forth in para 2.3.1.2 c.

2.3.1.3 Contingency Procedures

a. Non-receipt of SCM. If no SCM is received and voice instructions cannot be obtained from the AOCC, the MC will ensure that the ARIA remains passive (carrier off).

b. Minor Failure of Equipment. During pass time, if equipment failures occur that neither hinder the remoting nor cause the loss of prime data, the PMEE operators will reconfigure to a backup mode as quickly as possible to prevent loss of data. The MC will report the equipment failure to the AOCC on the secondary circuit. If the secondary circuit is not available, the report will be made postpass.

c. Major Failure of Equipment. If equipment failures occur that hinder remoting or cause loss of any prime data, the MC will select the best path to restore the prime data or remoted voice, and will inform the AOCC by means of the secondary HF circuit.

d. Inability to Comply with SCM. In the event a problem precludes compliance with the SCM, the MC will contact the AOCC for instructions.

e. Spacecraft Downlink Failure. If an anomaly is observed in the spacecraft downlinks, the MC will briefly describe the condition to the AOCC on the secondary HF Net. If the secondary Net is not available, the report will be made postpass.

f. ARIA Voice Remoting Capability Failure. If an ARIA voice remoting capability should fail during remoted pass, the MC will report the failure to AOCC on the secondary HF Net. ACON will relay the report to MCC on Net 2 and ARIA will stand by for instructions from either MCC on the primary HF Net, or from AOCC on the secondary HF Net. In the event the secondary HF Net is unavailable, the MC will switch to local, make the announcement, and return to remote.

g. Non-availability of Secondary HF Net. If the secondary HF Net is unavailable, the MC will make the reports listed in table 2-1 on the primary HF Net in the local mode. Whenever a report is to be made after the ARIA is in the remote mode, the MC will go to local, make the report, and immediately return to remote.

Note

Do not use link override. If there is conversation on the Net, do not interrupt with report.

h. Contingency Handovers (Partial A-G Remoting Capability Failure.) If the ARIA is no-go for A-G remoting (either uplink or downlink) and a handover is planned with an STDN station, conditions that will exist are:

(1) Condition Known Prior to H-1 Minute. MCC will notify the AOCC and the STDN station that ARIA will stay local until station LOS. Coordination will be on Net 2. At station LOS, MCC will notify ARIA on GOSS Conference to go remote.

Table 2-1. Typical Pass-time Announcements

Conditions	Report on Secondary HF Net	Report on Primary HF Net*
USB carrier on voice remote	"ARIA_____Remote carrier on"	None
Initial Down- link RF contact with the space- craft.	"ARIA_____AOS"	"ARIA_____AOS"
Adequate VHF S/S for voice relay.	"ARIA_____go for remote VHF"	"ARIA_____go for remote VHF"
Two-way lock USB solid.	"ARIA_____go for remote USB"	"ARIA_____go for remote USB"
Adequate VHF S/S and solid USB two-way lock.	"ARIA_____go for remote VHF and USB"	"ARIA_____go for remote VHF and USB"
Termination of downlink RF contact with the spacecraft.	"ARIA_____LOS"	"ARIA_____LOS"
USB carrier off, Local.	"ARIA_____local carrier off"	None
*Used only if secondary HF Net is unavailable (see para 2.3.1.3g).		

(2) Condition Known After H-1 Minute. MCC will notify the ARIA to stay local on the primary HF Net (or the secondary Net, if available). MCC will also notify the STDN station to stay remote until LOS. This will be done on Net 2. At station LOS, MCC will notify ARIA to go remote.

i. Contingency Handover (Other than A-G Remoting Failure). If the ARIA has a partial failure of the USB system and a handover is planned with a STDN station, conditions that will exist are:

(1) Conditions Known Prior to H-1 Minute

(a) MCC will notify the AOCC and the STDN stations that ARIA will not bring up its carriers until station LOS. Coordination will be on Net 2.

(b) At station LOS, MCC will notify ARIA to bring its carriers up. Coordination will be on GOSS Conference.

(2) Conditions Known After H-1 Minute

(a) MCC will notify the ARIA on the primary HF Net (or the secondary HF Net, if available) to leave its carriers down. MCC will also notify the STDN station to leave its carriers up until LOS. Coordination will be on Net 2.

(b) At station LOS, MCC will notify ARIA to bring its carriers up. Coordination will be on GOSS Conference.

j. Loss of Communication to MCC. No voice contact with the spacecraft will be initiated by the ARIA MC except as directed by MCC. However, if the communication link between ARIA and MCC is inoperative, and the spacecraft calls, the ARIA MC will inform the astronauts that communications to MCC are out and that ARIA is standing by to record comments for relay to MCC when communications are restored. The MC will use link override for such spacecraft contact.

Note

In the event that voice remoting is impossible or the voice quality is poor in the remoted mode, the MCC CapCom may call upon the ARIA MC to relay messages directly to the spacecraft crew.

k. Contingency Handover Between Two ARIA

(1) Secondary HF Net Available. If an active ARIA fails for any reason and a second ARIA is in a position to assume the active role, the Cape ComTech will coordinate with the Houston ComTech who will notify CapCom. If both aircraft have an operational secondary HF circuit, they will be bridged together by the Cape ComTech. Houston (either ComTech or CapCom) will call both ARIA simultaneously: "ARIA-1, ARIA-2, on my mark handover, 3-2-1 Mark." ARIA-1 (assuming it to have been the active aircraft) will go local and bring its S-band carrier down. ARIA-2 will go remote and bring up its S-band carrier.

(2) Secondary HF Net Not Available. Both ARIA will be bridged to GOSS Conf for MCC's handover command. It is fully recognized that under this condition the handover command will be remoted through the active ARIA to the spacecraft.

l. Manual Key. If the voice relay circuit cannot be cleared of noise or interference by the automatic quieting circuits, the MC will coordinate with the HF operator and the Cape Kennedy ARIA ComTech to implement manual key procedures. The MC will notify the AOCC that his ARIA is "red, can support" for voice relay due to noise, interference, etc. (refer to para 2.3.6.3).

m. Contingency Voice Procedure Between CapCom and MC. Under certain conditions, it may be necessary for the MCC CapCom to communicate directly with an ARIA MC. Such contact will be via the primary HF Net. If the ARIA is in local mode, a normal conversation may be accomplished. If however, the ARIA is in the remote mode when the CapCom calls, the MC will go to the local mode for the duration of the conversation. When the conversation is terminated, the CapCom at his discretion will direct the MC to return to remote. Acknowledgements to the CapCom's instructions are mandatory unless CapCom

specifically indicates otherwise. Do not use link override for communication with the CapCom.

2.3.1.4 Intercom System

a. Available Loops. The ARIA intercom system has the following conference loops available to all operators: Conference A, Conference B, Conference C, PMEE IC, Voice Annotate, Hot Mike, and MC call.

b. Operational Procedures

- (1) PMEE IC loop will be monitored by all crew members at all times. This loop is to be used for crew briefings, initial contact on an individual basis and announcement of events as necessary.
- (2) MC call will be used for point-to-point contact between the MC and other positions. It may be used by the MC for a conference loop if desired.
- (3) Conference A will be monitored at all times by all positions. This loop is the primary "talk loop" for all positions except the MC.
- (4) Conference B will be monitored at all times by the Systems Analyst (SA), voice, and telemetry positions, and is to be used for phasing checks with the antenna position during precalibrations and postcalibrations.
- (5) Conference C will not normally be monitored but may be used for coordination as required by the MC or SA.
- (6) All crew members will monitor PMEE IC, Conference A, MC Call, and their respective conference loops at all times.
- (7) PMEE IC tie will be selected by the MC not later than H-3. This will tie the PMEE operators into the aircraft intercom loop for better crew coordination during the pass.

c. Contingency Procedures

- (1) If a failure in any prime conference loop occurs, the MC will assign an alternate loop.
- (2) If a complete failure of the intercom system occurs, the emergency loop (call button) may be used.

2.3.1.5 Typical Pass Activities for MC. The MC will use the TU 28319-1 abbreviated checklist.

2.3.2 SYSTEM ANALYST

2.3.2.1 General. The SA is the senior PMEE operator on ARIA. He assists and backs up the MC and is qualified to substitute at any operator position.

2.3.2.2 Operating Procedures

a. Prepass

- (1) As senior operator, the SA will assist all other instrumentation operators as required during ARIA operation. During calibrations he is responsible for and directs all instrumentation operators and ensures that the ARIA is configured and calibrated for the assigned mission. Upon satisfactory completion of the calibrations he will report status to the MC.

(2) He is responsible for all PMEE documents, procedures, and equipment on his aircraft. He ensures that his operators comply with all directives in support of the assigned mission.

(3) At H-30 he will follow through (no response) with the MC on the H-30 checklist.

b. Passtime

(1) During flight his prime responsibility is to aid the MC in mission coordination and assist any instrumentation operator as required.

(2) He will deliver all messages (for example: acq, SCM, composite radio frequency [CRF]) from HF TTY to the proper recipients.

c. Postpass

(1) The SA will ensure that all tape labels and logs are correct before data distribution is made.

(2) The SA will ensure that all "red" items are correctly noted in AFTO 781, Part 2.

2.3.2.3 Contingency Procedures

a. The SA will substitute for any PMEE operator or the MC as required to ensure accomplishment of mission objectives.

b. He will advise the MC on available courses of action in the event of equipment malfunctions or changes in mission requirements.

2.3.3 TELEMETRY OPERATOR

2.3.3.1 General. The telemetry (TLM) operator operates the TLM and data receivers, and associated test equipment.

a. Equipment will be set up in accordance with the mission OD, mission supplements and the SCM.

b. All equipment calibrations will be performed by following the procedures outlined in TU-28319-1.

c. The TLM operator will maintain a log on problems and activities throughout the mission.

2.3.3.2 Operating Procedures

a. Prepass

(1) At power on, the operator selects the NO-GO PBI. When the operator has successfully completed his checks, he selects the GO PBI. Any time during the mission period the operator discovers an equipment failure, he will select the FAILURE PBI. Upon MC acknowledgement, light logic will be cleared as directed.

(2) AGC calibrations and checklists will be completed by H-30 minutes. Any "red" items and the ETO will be reported to the MC.

(3) Prior to H-30 minutes, the TLM operator will select the XTAL mode of the receiver first local oscillator, VFO or XTAL (with PM demod) for the second local oscillator.

(4) Prior to H-5 minutes the TLM operator will patch the signal generator output into the step attenuator, terminate the step attenuator output in a 50-ohm load, select 99-dB attenuation on step attenuator, and select L-BAND on the signal generator.

(5) After usable signal has been received (approx 10dB S:N) the TLM operator will adjust the receiver for a 0 indication on the tuning meter.

b. Passtime

(1) After usable signal has been received (approx 10dB S:N) the TLM operator will adjust the gain control of each receiver, from which filtered video is recorded, for 0-dB indication on the output meter.

(2) The TLM operator will monitor receivers and spectrum display unit (SDU) during the pass, checking for signal strength and any spurious signals.

c. Postpass. The TLM operator will report the start and stop times of spacecraft TLM modulation.

2.3.3.3 Contingency Procedures

a. The TLM operator will be prepared to reconfigure the RF patching in the event of a receiver failure. If there is a prime receiver failure, a standby receiver or a lesser priority receiver will be tuned and patched to the prime link. Receiver priorities are in the mission OD and the NOP supplements.

b. The TLM operator will notify the MC of any apparent spacecraft link failure. Appropriate steps will be taken after the pass to verify that the failure was not in the ARIA system. A CRF message may be received from a previous tracking station. If the CRF indicates a VHF link frequency off-nominal by 200 kHz or more, the first local oscillator will be operated in the VFO mode.

2.3.3.4 Typical Pass Activities for TLM Operator. The TLM operator will use the TU 28319-1 abbreviated checklist.

2.3.4 VOICE OPERATOR

2.3.4.1 General. The voice operator operates the voice uplink transmitter, voice and tracking receivers, and associated test equipment.

a. Equipment will be set up in accordance with the mission OD, mission supplements and SCM.

b. All equipment calibrations will be performed by following the procedures outlined in TU 28319-1.

c. The voice operator will maintain logs on problems and activities throughout the mission.

2.3.4.2 Operating Procedures

a. General. When power is turned on, the voice operator will select the NO-GO PBI. When the operator has successfully completed his checks, he will select the GO PBI. Any time an equipment failure occurs during the mission period, he will select the FAILURE PBI. Upon MC acknowledgement, he will clear the light logic as directed.

b. Prepass

(1) ACC calibrations will be completed by H-30 minutes. All "red" items and ETO will be reported to the MC at H-30 minutes.

(2) At H-10 minutes, the MC will coordinate with the navigator and direct the antenna to be taken out of stow. The voice operator will then verify the phasing of the tracking receivers.

(3) VHF Voice (296.8 MHz). Prior to H-30 minutes the voice operator will select the XTAL mode of the receiver first local oscillator and VFO or XTAL (with PM demod) for the second local oscillator.

(4) USB (One-way and Two-way Lock). Prior to H-25 minutes the voice operator will verify that the SDD TLM demodulator XVCO is at the proper rest frequency, using the procedures outlined in TU 28319-1.

c. Acquisition

(1) USB. After usable signal has been received (approx 10dB S:N) the voice operator will adjust the receiver for a 0 indication on the tuning meter. The following steps will be used only when the SCM indicates that two-way lock is to be used for that pass:

Note

Passive mode will be maintained if neither SCM or voice update are received.

(a) Prior to H-15 minutes the uplink transmitter frequency should be set to nominal center frequency as indicated in the Instrumentation Almanac for a mission. Record the vernier dial setting of the FREQUENCY TUNING control. Adjust the FREQUENCY TUNING control for the nominal center frequency plus/minus Doppler (according to the Instrumentation Almanac at the GET of attempted lock-up). Record the vernier dial setting.

(b) Repeat step (a) for the backup transmitter.

(c) At H-5 minutes ensure that both verniers are set to give the proper frequency (nominal plus/minus Doppler) and turn the frequency counter at the voice position off.

(d) The modulation of the uplink transmitter must be turned off before turning the transmitter on in order to prevent transponder lock-on to sidebands of the 30-kHz subcarrier.

(e) At the time specified in the SCM the voice operator will bring up his USB transmitter and initiate a frequency search about the spacecraft nominal receive frequency. An automatic (triangular) sweep period of 5 seconds will be used unless otherwise indicated in the mission OD.

- (f) As the uplink sweeps through the spacecraft receiver pass band, the spacecraft receiver should lock on and follow the sweep at the same rate.
- (g) If uplink transmitter on after downlink lock is established, the following should be adhered to:

1. The active and backup transmitters should be preset to the vernier setting of the FREQUENCY TUNING control that corresponds to the nominal center frequency plus/minus Doppler.
2. At the time specified in the SCM, or as directed by the MC, the voice operator will turn on the uplink transmitter and initiate a frequency search. As the sweep frequency sweeps through the spacecraft receiver pass band, the spacecraft receiver should phase lock and follow the sweep. When the spacecraft transmitter locks to the uplink signal, a jump in frequency may occur. This may cause a loss of lock by the receiver PM demod; the demod will automatically reacquire if this loss occurs.

Note

The procedures in subparagraph (g) will be used at the time specified in the SCM, and upon direction from the MC when the ARIA is receiving handover.

- (h) The voice operator should verify transponder two-way lock by observing the receiver tuning meter. If the tuning meter is observed to be following the triangular sweep pattern of the transmitter, the operator should deactivate automatic sweep during a sweep toward center frequency of the tuning meter.

Note

Do not go to manual sweep while sweeping away from center of sweep range on the tuning meter.

- (i) After the uplink transmitter sweep is deactivated, the voice operator will verify positive two-way lock by manually detuning the uplink transmitter while observing the ARIA receiver tuning meter tracking the manual adjustment.
- (j) After confirming positive two-way lock, the voice operator will slowly and smoothly (over a period of approximately 5 seconds) return the vernier control to the preset value for the ARIA transmitter nominal center frequency. Ensure that the standby transmitter is also tuned to the nominal center frequency.
- (k) The voice operator will then turn on the uplink transmitter modulation and notify MC: "Active two-way lock."

- (2) VHF and USB. After a usable signal (approx 10 dB S:N) has been received, the voice operator will adjust the gain control of each receiver for a 0-dB indication on the output meter, while post-detected video is recorded.

d. Passtime

- (1) The voice operator will monitor the SDD data outputs and SDU, checking signal strength and any spurious signals.

- (2) The voice operator will announce pass progress on the PMEE IC loop; for example, AOS, one-way (or two-way) lock, LOS, and any abnormalities such as severe multipath, tumbling, etc.
- (3) The uplink modulation for both USB and VHF will be monitored through the ICS/SIDETONE switch and VHF/UHF monitor switch.
- (4) The SDD front panel lights and appropriate SDU will be monitored for indications of emergency voice operation.
- (5) The uplink carrier will be deactivated at the time specified in the SCM or upon command from the MC.

2.3.4.3 Contingency Procedures

- a. If loss of two-way lock with the command-service module (CSM) occurs, the spacecraft transponder will return to the auxiliary oscillator frequency (the lunar module [LM] does not have an auxiliary oscillator). The voice operator will initiate auto sweep mode with the ARIA transmitter set for nominal center frequency. When two-way lock has been accomplished, deactivate the auto sweep mode while the tuning meter is being swept toward center of sweep range on tuning meter. After manual mode has been selected, verify two-way lock by manually tuning the vernier and observing track of tuning meter. The vernier should then be reset to the nominal center frequency setting.
- b. If loss of one input to any voice combiner occurs, a front panel fail-safe light will illuminate. The voice operator will attempt to restore the lost input. If this cannot be accomplished, he will bypass the combiner with the remaining input channel to prevent further degradation.
- c. The standby link transmitter will be tuned to the same frequency as the active transmitter. If loss of the active transmitter occurs, the standby transmitter will be selected and two-way lock will be accomplished in accordance with the procedures described.
- d. The MC will be notified of any apparent spacecraft link failure. Appropriate steps should be taken after the pass to verify that the failure was not in the ARIA system.
- e. Should the CRF indicate that the VHF link selected for tracking is off-frequency by 200 kHz or more, the first local oscillator will be operated in the VFO mode.
- f. If a change in tracking frequency is required, the voice operator will retune and rephase the affected tracking receivers at the new frequency and verify proper carrier-operated relay operation. The MC will be informed at completion of these steps.
- g. If loss of downlink (link 2287.5 MHz) occurs, the following procedure will be used to support uplink S-band voice:
 - (1) S-band uplink transmitter frequency to be set NORMAL (2106.4 MHz).
 - (2) AUTO/MANUAL sweep set to AUTO.
 - (3) TIME/SWEEP - 15 seconds.
 - (4) After approximately 60 seconds (3.5 sweeps) set AUTO/MANUAL sweep to MANUAL.
 - (5) Turn modulation ON.
 - (6) Notify MC of two-way lock.

2.3.4.4 Typical Pass Activities for Voice Operator. The voice operator will use the TU 28319-1 abbreviated checklist.

2.3.5 ANTENNA OPERATOR

2.3.5.1 General. The antenna operator operates the steerable antenna.

- a. The antenna will be set up in accordance with the Mission OD, this NOP, and the mission supplements.
- b. All equipment calibrations will be performed by following the procedures outlined in the TU 28319-1.
- c. A log will be maintained on problems and activities throughout the mission.

2.3.5.2 Operating Procedures

- a. General. At power-on the antenna operator will select the NO-GO PBI. After completion of his checks he will select the GO PBI. The FAILURE PBI will be selected for any equipment failures. Upon MC acknowledgement, light logic will be cleared.
- b. Prepass
 - (1) Any "red" items and the ETO will be reported to the MC.
 - (2) When the navigator has secured his radar, the MC grants clearance for the antenna operator to bring the antenna out of stow. The antenna will be placed in the approximate acquisition position relative to the aircraft.
 - (3) The scan parameters specified in the Instrumentation Almanac will be selected. The tracking combiner will normally be placed in the VHF/UHF OPTIMUM mode.

Note

A blank in the SCAN PARAMETER columns of the Instrumentation Almanac indicates that no scan is required. If tracking VHF or UHF only, the tracking combiner will be operated in VHF OPTIMUM or UHF OPTIMUM mode as appropriate.

c. Passtime

- (1) At H-3 minutes the aircraft will pick up its final AOS heading and the antenna will be positioned precisely according to the Instrumentation Almanac. SECTOR SCAN and AUTO ACQ modes will be selected.

Note

It may be expected that initial acquisition will be on VHF. The antenna will automatically go into the autotrack mode and will switch to USB for tracking when USB AOS occurs (6-dB carrier-to-noise ratio).

- (2) When autotrack has been achieved, the antenna operator will announce on the PMEE IC loop: "VHF autotrack" or "UHF autotrack," as appropriate.
- (3) The antenna operator will use the predicted target controls on the console to follow up the antenna indicators when in autotrack mode. These markers will be used for repositioning the antenna in the event of a loss of lock that results in the antenna driving off track.

2.3.5.3 Contingency Procedures

- a. If AOS has not been achieved by H+30 seconds, the antenna will be positioned to the look angle for H+2 minutes and scan reinitiated. If AOS is not achieved by H+3 minutes, the antenna will be positioned to the look angle for H+4 minutes and scan reinitiated.
- b. If a change in spacecraft trajectory or aircraft TSP occurs it will be necessary to use an updated acquisition message instead of the premission ARIA Instrumentation Almanac. These acquisition messages will be sent from the AOCC (when required) by TTY. Voice transmission may be used if TTY is unsatisfactory.
- c. If autotracking becomes impossible, the operator will manually track, using his panel meters for steering information.

2.3.5.4 Typical Pass Activities for Antenna Operator. The antenna operator will use the TU 28319-1 abbreviated checklist.

2.3.6 HF OPERATOR

2.3.6.1 General. The HF operator operates the HF communications. TTY and TACSAT equipment as follows:

- a. Equipment will be set up in accordance with the mission OD, mission supplements, this NOP, and the SCM.
- b. All equipment calibrations will be performed by following the procedures outlined in the TU 28319-1.
- c. A log on problems and activities will be maintained throughout the mission. In addition, a radio log sheet will be maintained showing the date-time group of all messages transmitted and received by the station.
- d. The HF operator functions as the TTY operator aboard the ARIA. As messages are received, he notifies the MC and provides copies to the systems analyst for distribution. He will maintain a traffic file of all incoming and outgoing messages for use by the MC during the flight and for postmission activities.
- e. The TACSAT terminal setup for real-time telemetry is as follows:

<u>Unit/Function</u>	<u>Indication/Setting</u>
Mode switch	TTY
Satellite	A
Channel set (Rcvr)	11
Channel set (Transmit)	10
PWR control	30 dBW
Local/remote switch	LOC
Antenna select	Overhead

2.3.6.2 Operating Procedures

- a. General. When power is turned on, the HF operator will select the NO-GO PBI. After completion of operator checks, the GO PBI will be selected. The FAILURE PBI will be pressed for any equipment failures noted during the mission. Light logic will be cleared upon MC direction.
- b. Prepass
 - (1) Contact will be established with the ground radio network on the frequencies specified in the mission briefing. This will be accomplished as in-flight checks are completed for one transmitter and receiver.
 - (2) All equipment will be tuned to the frequencies and sidebands directed by the ARIA ComTech. For each change in frequency, the HF operator will ensure that the antennas are properly loaded and that the trailing wire is adjusted to the correct length.
 - (3) The HF operator will work closely with the ground ARIA ComTech to ensure that high quality HF circuits are maintained at all times. He will inform the ComTech immediately of any difficulty in receiving either TTY or voice traffic. He will provide any other information to the ComTech that might be helpful; for example, if the quality of a different HF circuit is better, the ComTech should be informed.
- c. Passtime. The PMEE IC loop will be monitored from H-3 minutes until LOS+3 minutes for instruction from the MC to go remote or go local.

2.3.6.3 Contingency Procedures

- a. Should the ARIA experience a failure of a prime HF transmitter, receiver, or antenna, the HF operator will inform the MC immediately and repatch and/or re-tune backup equipment to restore the prime circuit.
- b. If loss of trailing wire drogue is indicated by the LOW TORQUE and OUT lights, the HF operator and the copilot will close the shear switches to jettison the antenna.
- c. If it seems that the aircraft has lost communications with the ground station on the primary mission frequency, the HF operator will request that the MC attempt to establish communications on the aircraft operation control network (AS-2) through the pilot, as specified in paragraph 2.2.4.4 of this NOP.
- d. If the voice relay circuit cannot be cleared of noise or interference to the point that the interfering signal ceases to key the remoting system, the HF operator will implement manual key procedures as follows:
 - (1) The HF operator will inform the MC and Cape Kennedy ComTech that he cannot prevent relay of noise by system adjustment and request manual key procedure.
 - (2) The Cape Kennedy ARIA ComTech will coordinate with MCC to have the CapCom use manual key voice procedures during the affected ARIA passes.
 - (3) The HF operator will press the VHF and UHF transmit buttons to the OFF position (376-17 box).
 - (4) The CapCom will give the spacecraft call sign twice before each transmission. At the first call sign, the HF operator will press the VHF and UHF transmit buttons to the ON position (376-17 box).
 - (5) When CapCom says "over," the HF operator will return the VHF and UHF transmit buttons to the OFF position (376-17 box).

2.3.6.4 Typical Pass Activities for HF Operator. The HF operator will use the TU 28319-1 abbreviated checklist.

2.3.7 RECORDER/TIMING OPERATOR

2.3.7.1 General. The record/timing operator operates the timing system and all magnetic recording instrumentation and associated test equipment.

- a. Equipment will be set up in accordance with the mission OD, mission supplements, this NOP, and DCN or ISI instructions.
- b. All equipment calibrations will be performed by following the procedures outlined in TU 28319-1.
- c. The record/timing operator will maintain a log on problems and activities throughout the mission.

2.3.7.2 Operating Procedures

a. General

- (1) When power is turned on, the record/timing operator will select the NO-GO PBI; after completion of operator checks the GO PBI will be selected. The FAILURE PBI will be pressed for any equipment failure noted during the mission. The light logic will be cleared upon MC direction.
- (2) As soon as possible after takeoff, verify time patch-panel setup monitor and confirm synchronization of the time signal generators with an approved time standard radio station, such as WWV/WWVH. During normal operation, constant surveillance of the timing rack is not required as circuit monitors provide an automatic alarm system with audible tone alarms and fault lamps.

b. Prepass

- (1) If the wideband recorders are to be operated at 120 in./sec, it may be necessary for the record/timing operator to load the recorder with new tape immediately after completing his pre-cals. If, however, the recorders are to be operated at 60 in./sec, pre-cals may be recorded on the data tape.
- (2) At H-30 minutes the record/timing operator will clean the wideband tape heads and guides, load the mission tape, and voice annotate the recorders sequentially with all information on the tape data labels (tape permitting).

c. Passtime

- (1) The wideband recorders will be turned on upon direction from the MC; verify that speed sync lock is obtained.
- (2) At AOS+30 seconds, the record/timing operator will verify a 0-dB indication by visually monitoring the direct record level meters. If more than ± 1 -dB variation is observed on the pre-D record amplifiers, reset to 0 dB if a relatively noise-free signal is being received. For a video direct record amplifier, do not reset to 0 dB (due to the peak reading characteristics of the meters). Check with the telemetry and voice operators to confirm that receiver outputs are set for proper output levels.
- (3) The FM monitor scopes will be monitored to assure that the carrier of the FM record amplifier is being properly deviated. Reset deviation of the FM modulators if required. (Datatracks only.) Deviation should not be changed on MUX tracks after pre-cals are completed (should be completed during verification check).
- (4) The outputs of the reproduce preamplifiers of each direct record track will be monitored off-tape using the oscilloscope and PPM. If the signal is noisy, check with the telemetry and voice operators for a possible station problem.
- (5) Verify that each required IRIG subcarrier of the data MUX 1 and 2 is present on playback by using the FM reproduce amplifier, data MUX calibrator, and oscilloscope.
- (6) Turn wideband recorders off upon direction from MC or at LOS +1 minute.

2.3.7.3 Contingency Procedures

- a. If there is a failure of a recorder or a recorder channel, the record/timing operator will notify the MC. The MC will obtain instructions from the AOCC and will notify the record/timing operator of track reassignments. The record/timing operator must be prepared to repatch in order to assure the recording of high-priority data.
- b. If an IRIG subcarrier is not present when monitored off tape, the patching at the record position will be verified. The record operator will coordinate with the telemetry operator to verify agreement in patching assignment.

2.3.7.4 Typical Pass Activities for Record/Timing Operator. The record/timing operator will use the TU 28319-1 abbreviated checklist.

2.3.8 REAL-TIME TELEMETRY OPERATOR

Refer to Section 10 of the mission supplements.

2.4 PROCEDURES FOR ARIA DATA TRANSFER

2.4.1 GENERAL

- a. An ARIA may be required to transfer VHF or USB recorded data to a STDN ground station during a mission. If so, the NC and ACON will coordinate the transfer to assure that sufficient fuel remains to allow the ARIA to recover safely after the operation.
- b. Upon data reception at the ground station one of the following operations will occur:
 - (1) The data may be remoted in real-time to MCC and GSFC.
 - (2) The data may be reduced at the station and pertinent information passed to MCC.
 - (3) The data may be recorded for later processing.

2.4.2 FLIGHT PROCEDURES

- a. ARIA will fly a track compatible with the tracking capability of the ground station. Maximum transfer ranges are shown in table 2-2. The flight plan must take into account keyholes in various antenna systems. Keyholes for the 30- and 85-foot prime USB stations are shown in figure 2-1. The 85-foot wing stations use HA-Dec (polar) antenna mounts with keyholes extending vertically from the horizon to approximately +35°. At GDSX and MADX the keyhole is north of the east-west axis; at HSKX it is to the south. A radial heading (figure 2-2) is preferred to minimize the effect of transfer antenna shadowing by the airframe. If may be necessary under constraints of time (transferring between revolutions) or fuel reserves (transferring while enroute to a recovery base) to retransfer while flying a tangential path (figure 2-3). A tangential path is always required for transferring to the tracking ship. The transfer can be accomplished at up to 85 percent of radio line-of-sight range to the ground station.
- b. Because of the belly-mounted transfer antennas, aircraft altitude is a factor in transfer signal quality. On a tangential course (figure 2-3), banking the aircraft toward the ground station will have the effect of screening or shadowing the signal. The radial flight pattern (figure 2-2) minimizes this problem, but descending on the inbound leg or climbing on the outboard leg will produce a similar effect. Therefore, care should be taken to maintain a straight and level attitude during transfer operations. Both VHF and S-band signals are affected by screening or shadowing, but the S-band signal is hypersensitive.

Table 2-2. Maximum Data Transfer Ranges

ARIA Altitude (ft)	Max Range (nmi)
35,000	185
30,000	175
25,000	165
20,000	145
15,000	125
10,000	105
5,000	75
Range is based on 85 percent of line-of-sight of a 4/3 earth radius. Ranges are to the nearest 5 nmi.	

c. Typical ARIA data transfer activities are as follows:

Time	Personnel	Activity
H-5	MC	Turn on VHF carrier (USB for 85-foot stations) without modulation.
AOS (100 % radio horizon)	MC	Initiate VHF (HF on 85-foot stations) voice contact with OPSR. Turn on S-band and VHF data transfer modulated carrier upon direction of station OPSR. Notify OPSR that data modulation is on.
	OPSR	Turn on chart recorder for signal strength test after solid lock with ARIA. Notify MC of links to be transferred; mode of transfer (VHF or USB); frequency used; time segment of data to be transferred; and verify with MC altitude, headings, and speed.
AOS +5 min (approx 90 % line-of-sight)	OPSR	Confirm ground station equipment is functioning satisfactorily and notify MC to stop modulation and prepare for data transfer. Turn off chart recorder.

Time	Personnel	Activity
	MC	Turn off modulation of VHF and S-band carriers. Ensure tapes are keyed to the proper start time. Inform OPSR that ARIA is ready for data transfer.
AOS +8 min. (approx 175 to 180 miles from ground station)	OPSR	Give go/no-go condition for the transfer. Inform MC: "The data transfer will be initiated on my mark."
	MC	Acknowledge receipt of message and stand by.
AOS +	OPSR	Start ground recorders; count down: "3...2...1...mark."
	MC	Turn on recorder in playback mode.
	MC	Inform OPSR that data has been transferred.
	OPSR	Stop ground recorders; verify that all data has been received and if no further data is needed, terminate the data transfer and release the ARIA.
Data transfer completed	MC	Secure the system and proceed to next TSP or to recovery base.

d. All data transfers will be accomplished at the same tape speed as the data record speed.

2.4.3 DATA TO BE TRANSFERRED

Only those channels required by MCC will be transferred. By using both S-band and VHF transmitters it is possible to transfer two tracks simultaneously. When transfer of more than one track is required, this mode of operation should be used to limit the transfer period. Transfer is limited to USB only at stations with 85-foot antennas.

2.4.4 VHF DATA TRANSFER

a. VHF data transfer will be PCM/FM on 245.3 MHz (normally). The link to be transferred on VHF will be a pre-D recorded track with a 450-kHz or 900-kHz center frequency. To transfer in this manner, the recorder output carrier will be converted to 10 MHz at 50 mv or 13dB input to the transmitter by the pre-D playback monitor. This 10-MHz signal will be fed to the VHF data transfer transmitter, which will transmit a PCM/FM signal. Deviation will be the same as received from the spacecraft (see figure 2-4).

b. It is also possible to transfer data that has been post-D FM recorded. (This would include simulation tapes.) The recorder output in this case is a PCM bit train on a 450-kHz/900-kHz FM carrier. This signal will also be converted to 10 MHz and fed to the data transfer transmitter. The transmitter output will be a PCM/FM signal with a deviation of ± 135 kHz or ± 270 kHz (see figure 2-4).

2.4.5 S-BAND DATA TRANSFER

S-band data transfer will be PCM/FM/PM. To accomplish an S-band transfer, the tape recorder FM output is not demodulated. The tape recorder output is a PCM/FM signal with the PCM bit train frequency modulating the 450- or 900-kHz record carrier with a deviation of ± 135 kHz or ± 270 kHz. This PCM/FM signal is used to phase-modulate the S-band data transfer carrier (2287.5 MHz) with a modulation index of 1.2 radians. The resulting signal is the PCM bit train frequency modulating a 450- or 900-kHz subcarrier, which, in turn, phase-modulates the S-band carrier (see figure 2-5). If the S-band receiver output is recorded direct on tape (2282.5 MHz DP-1B link) the data cannot be transferred due to the ground station demod's inability to cope with tape jitter.

2.4.6 ARIA GROUND STATION INTERFACE PROCEDURE

- a. During the data transfer operation, the ground station OPSR will assume operational control of the transfer sequence. The OPSR will coordinate his on- and off-station activities in conjunction with MCC or GSFC as appropriate.
- b. The ARIA VHF transmitter (USB over 85-foot antennas) will be turned on (carrier only) prior to line-of-sight range to the STDN station. This will permit the land station to locate the ARIA using the VHF or USB carrier as an acquisition beacon. (Because highly directional antennas are employed by the land stations, voice contact may be impossible without first acquiring by VHF or HF.) The ARIA MC will establish voice contact with the VHF ground station OPSR, on 296.8 MHz (or HF radio for stations with 85-foot antennas) as soon as the aircraft is within radio range (approximately 220 nautical miles at 35,000 feet). The MC and the station OPSR, in conjunction with MCC or GSFC as appropriate, will coordinate the details of the data transfer, establishing the links to be transferred, the mode of transfer, the frequencies to be used for given data, the time segment of data to be transferred, etc. The MC will also inform the station OPSR of the aircraft's position (referenced to the station), flight path, altitude, estimated time or transfer carrier contact, etc.
- c. The MC will have the transfer carriers turned on 10 minutes before modulation is to be applied to allow adequate warmup.
- d. When the ground station establishes solid contact with the transfer carriers, the OPSR will request the MC to turn on modulation. The MC will modulate his transmitters, verifying proper operation, and will inform the station OPSR that modulation is on.
- e. The station OPSR will confirm that the ground station equipment is functioning properly with the transfer signals. When he is satisfied, he will inform the aircraft that the transfer is a go condition and will advise the MC to stop modulation and prepare for the data transfer.
- f. The MC will ensure that the tape is cued to the proper start time and will inform the station OPSR when he is ready to transfer.

g. The station OPSR will coordinate with on-station personnel, GSFC, and MCC as appropriate, and will count down to a mark for the MC, at which time the MC will start the transfer.

h. The station OPSR will continue any necessary coordination during the transfer. When the station OPSR has received the required data, he will notify the MC to terminate the transfer. If no further data is required of the ARIA, the station OPSR will inform the MC that he is released.

2.4.7 VAN-TO-ARIA DATA TRANSFER

2.4.7.1 General. Telemetry data, recorded aboard ship will be transmitted from the ship to the aircraft using S-band. The aircraft will receive the data, record it on tape, and deliver the tape to the user as rapidly as possible.

2.4.7.2 Operating Procedures. The aircraft will approach the ship on a radial pattern. When VHF voice contact is established, the ship S-band transmitter will be brought up with modulation. The modulation source will be a tape copied from the mission tape recorded during the pass. When the aircraft has established recording levels and is ready to record, the ship will rewind the tape to the beginning of the data and stand by to start the transfer. The tape will be started on command from the aircraft. If there is insufficient time remaining to complete the transfer, the aircraft would be instructed to start the run over. Three full data passes will be required to transfer all the data. During each pass, one PCM link will be transmitted on the 1.024-MHz subcarrier; one FM/FM link will be transmitted using the 450-kHz carrier from the tape recorder, and the timing track must be repeated. Ship personnel should monitor the tape during playback and report any dropouts to the aircraft to avoid unnecessary reruns. As soon as the ship's C-band radar acquires track, the OPSR will pass azimuth and range to the ARIA at one minute intervals.

2.4.7.3 Sequence of Events

<u>Sequence</u>	<u>Position</u>	<u>Event</u>
1	OPSR	Establish equipment configuration and perform loop-back test.
2	OPSR/ARIA	Establish HF contact at approximately 500 miles (approximately 1 hour prior to data transfer).
3	OPSR/ARIA	Establish voice contact on 296.8-MHz link. Check secondary link, 259.7 MHz, and return to 296.8-MHz link.
4	ARIA	Turn on dump transmitters 245.3-MHz primary link, and 237.8-MHz secondary link.
5	OPSR	Confirm autotrack of 4-1 antenna.
6	ARIA	Confirm ARIA is on TSP, and request ship to transmit on 2282.5-MHz link.
7	OPSR	Turn test transmitter on and instruct ARIA that data will be uplinked for this pass.

<u>Sequence</u>	<u>Position</u>	<u>Events</u>
8	ARIA	Confirm autotrack. Request data for setup.
9	OPSR	Start tape (use the portion of the tape with good data for this setup period).
10	ARIA	Confirm that all data is good, or request setup change. Request ship to rewind data tape for start of data run.
11	OPSR	After data tape is rewound, confirm ARIA has sufficient amount of time remaining on TSP and good signal level.
12	OPSR/ARIA	Start data run. If at any time during the data run the ARIA has loss of data, the run should be aborted.
13	OPSR	Instruct ARIA when transfer is complete.

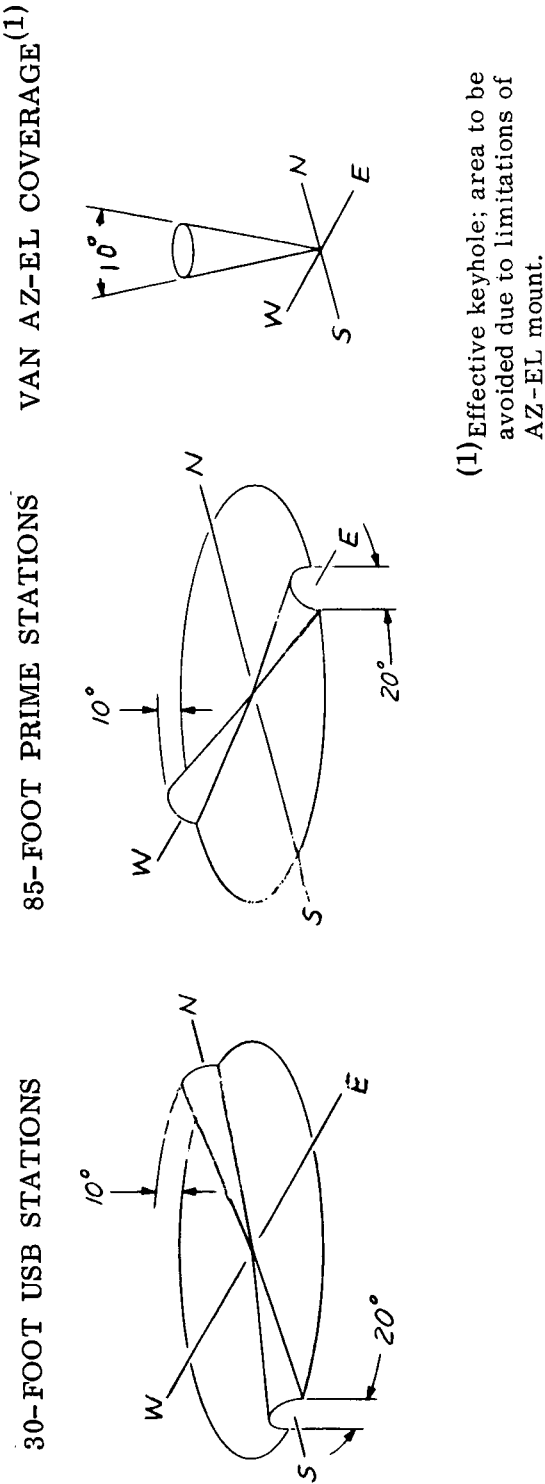


Figure 2-1. Location of Keyholes at Network Stations

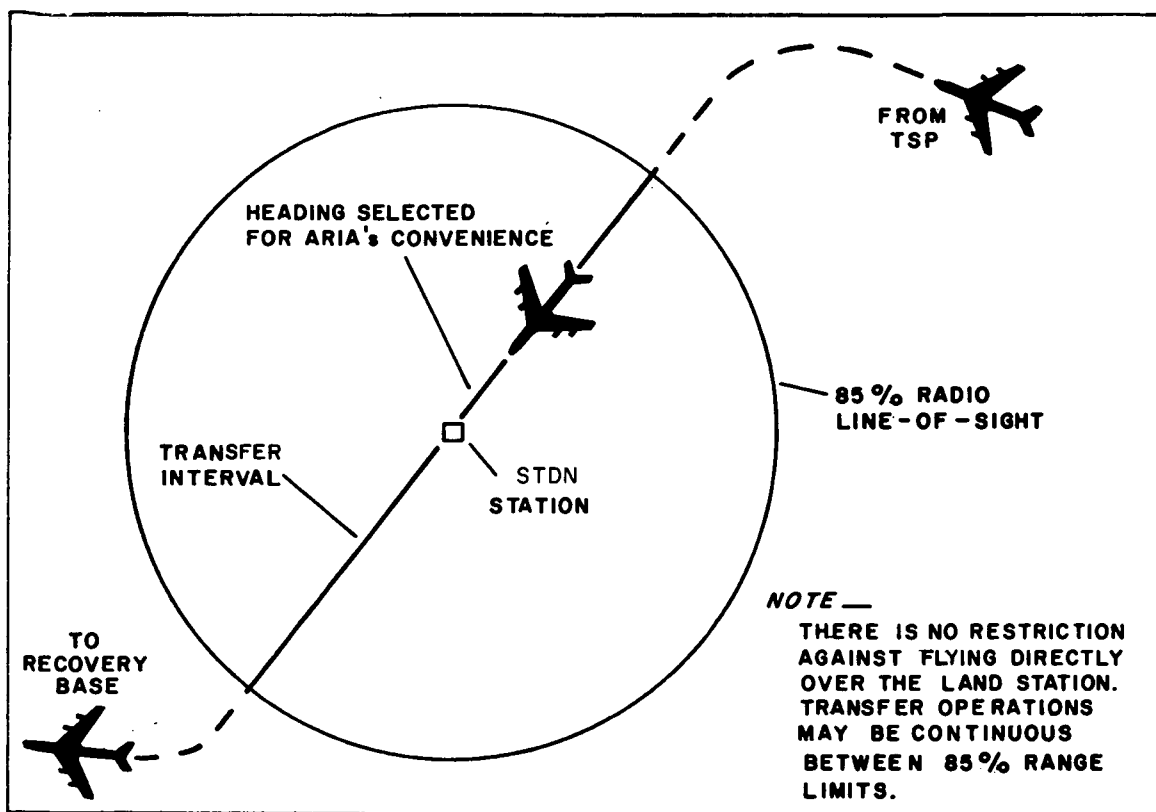


Figure 2-2. Preferred Transfer Heading - Radial

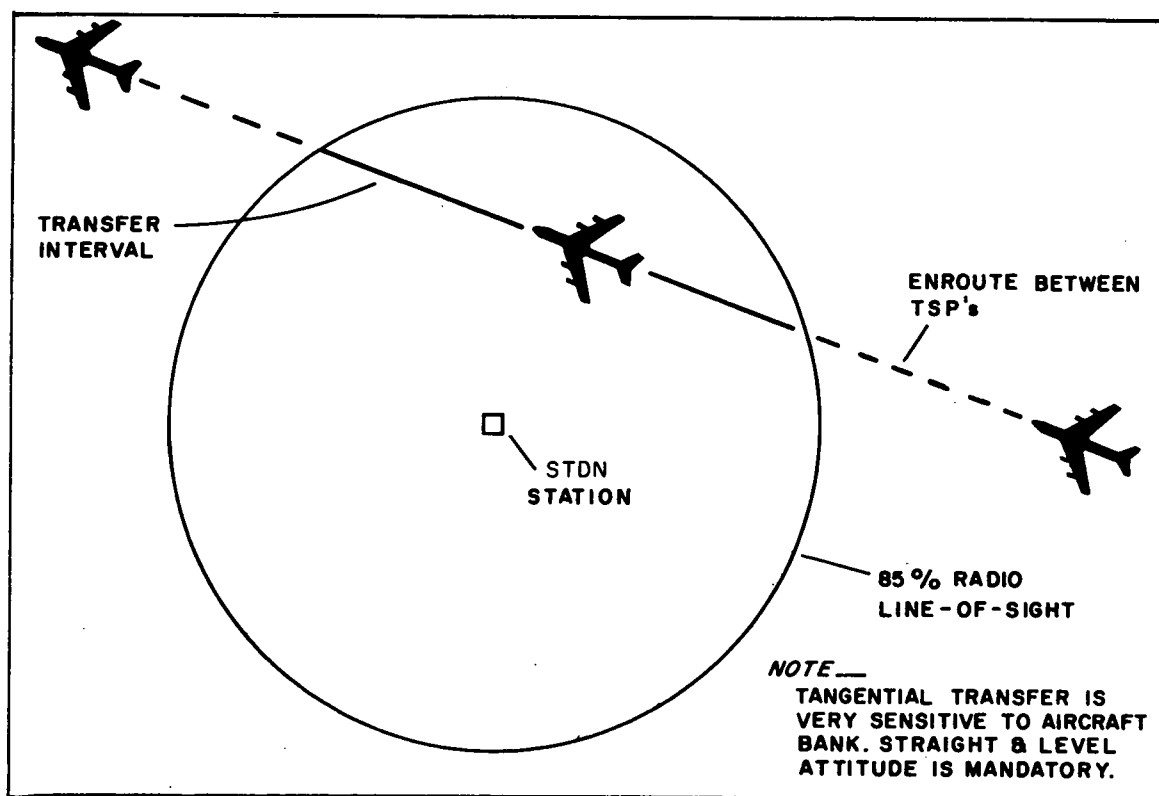


Figure 2-3. Alternate Transfer Heading - Tangential

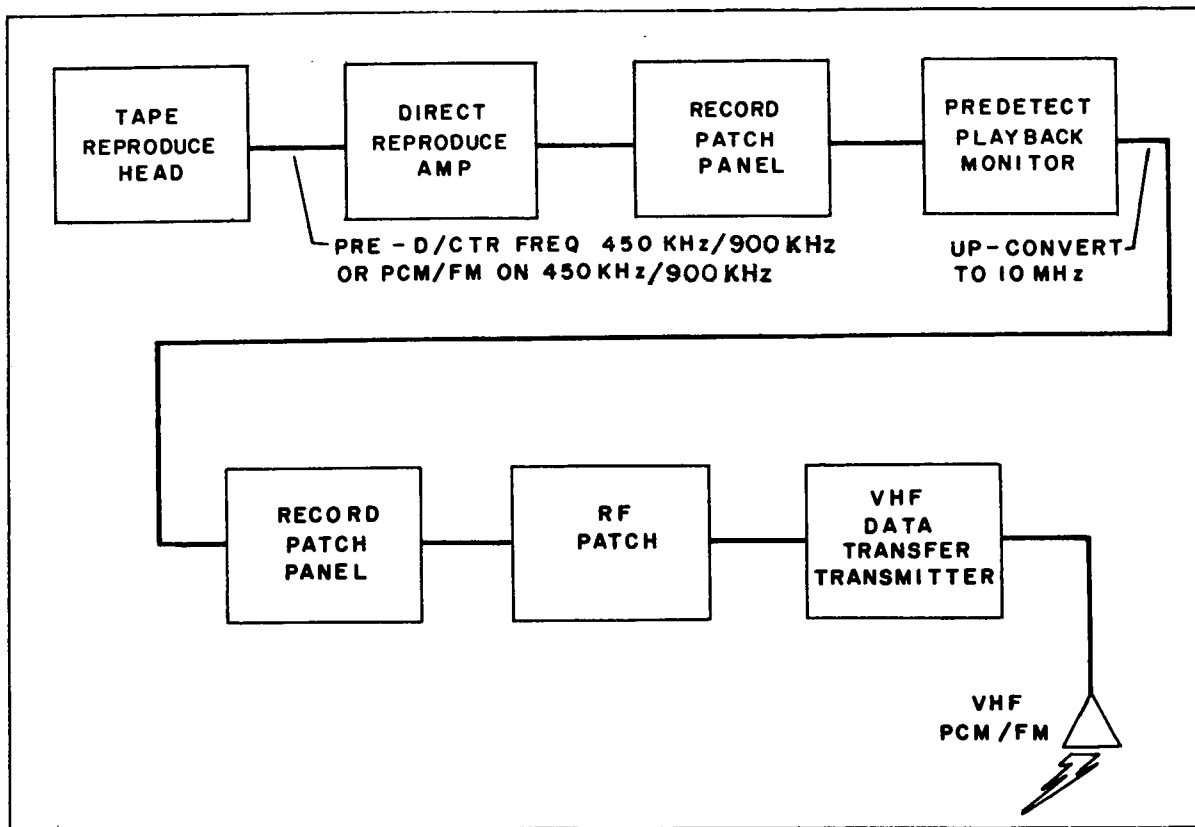


Figure 2-4. VHF Data Transfer

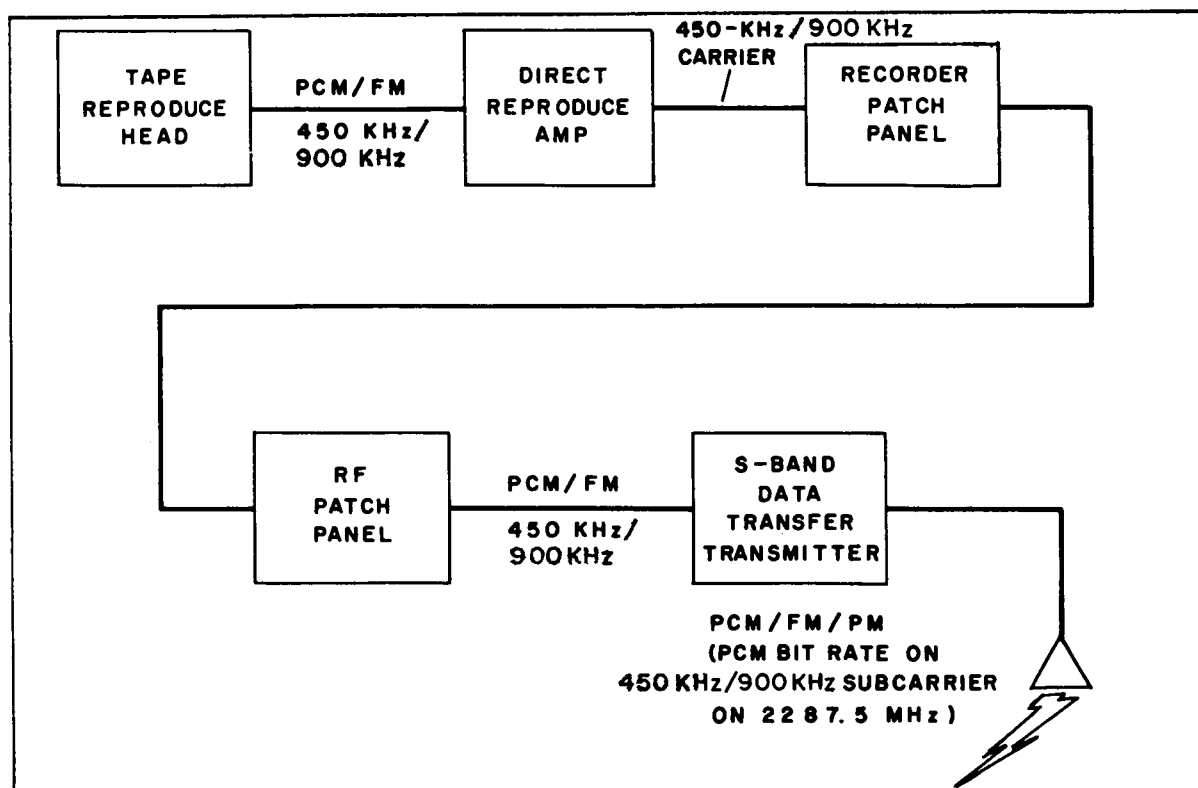


Figure 2-5. S-band Data Transfer

SECTION 3. EQUIPMENT MODIFICATIONS

3.1 GENERAL

Engineering configuration control of ARIA will be maintained for the DOD by the ETR. ETR Regulation No. 375-2, "Configuration Management," which supplements Air Force Regulation No. 57-4, "Modification/Moderation of Systems and Equipment," will be used as a guide.

3.2 GUIDELINES FOR ARIA MODIFICATIONS

3.2.1 APPROVAL

Prior to Configuration Control Board (CCB) action or prior to implementation of the change, the ETR will obtain NASA approval of all engineering changes and Air Force Logistics Command (AFLC)-generated Time Compliance Technical Orders (TCTO's) on ARIA which may have an effect on ETR support of Apollo missions.

3.2.2 AUTHORIZATION

All permanent or temporary engineering modifications made to ARIA will require one of the following types of authorization:

- a. A Configuration Control Board Directive (CCBD) approved by the ETR CCB and signed by the CCB chairman or his designated alternate.
- b. An approved CCBD plus an approved Class II Modification package (when indicated on the CCBD).
- c. An approved Engineering Change Request (ECR).
- d. An approved Temporary Change Request (TCR).
- e. An ETR approved AFLC TCTO.

3.2.3 POST-INSTALLATION EVALUATION

When requested and coordinated through the NASA Program Management Section (DOOP), NASA personnel shall be authorized to accomplish post-installation evaluation of engineering changes to ARIA.

3.2.4 REQUESTS FOR MODIFICATION

NASA requests for ARIA modifications will be submitted by letter or teletype message to DDMS with an information copy direct to the Agency or Range concerned.

SECTION 4. DOCUMENTATION

4.1 GENERAL

This section describes the procedures by which Network Operations Division operational documentation is affected.

4.2 TEST SUPPORT INSTRUCTION (TSI)

4.2.1 PURPOSE

A TSI is issued by the NOM during premission periods to modify premission support instructions, to authorize EC's, and to give operational directions. A TSI does not make a permanent change to documentation.

4.2.2 PARTICIPANTS

- a. ND/NOD.
- b. NOM.
- c. ACON.

4.2.3 PROCEDURES

- a. The originating and terminating TSI for all missions will be issued by the Network Director.
- b. A TSI may be used to instruct or direct a station to take action and may supersede any previously issued instructions or directions. A TSI requiring action within specific time limits will contain specific identification of those time limits within the text, e.g., EQUIPMENT MODIFICATIONS, TEMPORARY PROCEDURES.
- c. Upon receipt of TSI's, stations specified on the "TO" line will either comply with the contents or transmit a RIC explaining the reason for noncompliance.
- d. Stations on premission status but which are not included in the "TO" line will take no action.
- e. TSI's will be numbered consecutively for a specific mission.
- f. Corrections to TSI No. 001 will be made by a complete retransmission of the message; the number 001 will be retained. Paragraphs containing changes will be indicated by three R's (RRR) in the left margin.

Note

The Documentation Advisory Message will advise stations of the correct DTG of TSI No. 001.

- g. Corrections to other TSI's will be made by cancelling the original message and issuing a new TSI with a new TSI number utilizing three R's (RRR) to denote change.
- h. TSI's are in effect for a specific premission period; however, a TSI may be authorized for the associated mission period by an ISI.
- i. TSI's that answer RIC's will refer to the RIC by station, number, date-time group (DTG), and support identification code.
- j. TSI's that respond to Launch Support Requests (LSR's), Flight Support Requests (FSR's), Prelaunch Support Requests (PLSR's), will refer to them in the TSI text;

k. An equipment modification authorized by TSI, will be removed from the equipment after mission completion unless the modification is authorized as a permanent or an interim change by the terminating ISI.

l. A TSI may only be cancelled by a TSI or an ISI.

4.3 INSTRUMENTATION SUPPORT INSTRUCTION (ISI)

4.3.1 PURPOSE

This procedure provides the methods by which mission status is initiated and terminated, and by which mission directions and instructions are given. An ISI does not make a permanent change to documentation.

4.3.2 PARTICIPANTS

- a. ND/NOD.
- b. NOM/NC.
- c. ACON.

4.3.3 PROCEDURES

- a. The originating and terminating ISI for all missions will be issued by the Network Director.
- b. An ISI may be used to instruct or direct a station to take action and may supersede any previously issued instructions or directions. An ISI requiring action within specific time limits will contain specific identification of those time limits within the text, e.g. , EQUIPMENT MODIFICATIONS, TEMPORARY PROCEDURES.
- c. Upon receipt of ISI's, stations specified on the "TO" line will either comply with the contents or transmit a RIC explaining the reason for noncompliance.
- d. Stations on mission status but which are not included in the "TO" line will take no action.
- e. ISI's will be numbered consecutively for a specific mission.
- f. Corrections to ISI No. 001 will be made by a complete retransmission of the message; the number 001 will be retained. Paragraphs containing changes will be indicated by three R's (RRR) in the left margin.

Note

The Documentation Advisory Message will advise stations of the correct DTG of ISI No. 001.

- g. Corrections to other ISI's will be made by cancelling the original message and issuing a new ISI with a new ISI number utilizing three R's (RRR) to denote change.
- h. ISI's are in effect for a specific mission period.
- i. ISI's that answer RIC's will refer to the RIC by station, number, DTG, and support identification code.
- j. ISI's that respond to LSR's, FSR's, PLSR's, or ISI requests will refer to them in the ISI text.
- k. When a mission period phase transits from launch and early orbit to orbital, an ISI will be sent indicating this transition and terminating support for those sites supporting launch only.

l. An equipment modification authorized by an ISI, will be removed from the equipment after mission completion unless the modification is authorized as a permanent or an interim change by the terminating ISI.

m. An ISI may only be cancelled by an ISI.

4.4 SUPPORT REQUEST (SR)

4.4.1 PURPOSE

The SR is a network-generated request for information during nonmission periods.

4.4.2 PARTICIPANTS

- a. NEDIC (Network Documentation and Inquiry Controller).
- b. ACON.

4.4.3 PROCEDURES

- a. An SR may be generated by the AOCC and will pertain only to requests for information.
- b. An SR requesting information for a particular mission may be transmitted at any time prior to the issuance of either TSI 001 or ISI 001 for that mission and will be routed to all supporting stations. SR's which apply to other support activities may continue to be transmitted and processed.
- c. An SR may only be cancelled by another SR.
- d. An SR will be limited to a "SINGLE SUBJECT".
- e. An SR will refer to a support identification code if applicable, or indicate "N/A" if not applicable.
- f. Every SR will receive an answer.
- g. The SR will not be used for supply requisitions.
- h. Originators of an SR will include the station designator and will number SR's sequentially within the current month, i.e., AOCC third SR transmitted during June would be "AOCC SR 06-03", and the subject line.
- i. Outstanding SR's for a specific mission will be converted to RIC's by TSI 001 or ISI 001 indicating the station, the SR number, the DTG, and the RIC number assigned.
- j. Stations have the option to include other addressees in the SR header at any time that it appears necessary. The SR answer will also include these additional addresses.

4.5 SUPPORT REQUEST (SR) ACKNOWLEDGEMENT

4.5.1 PURPOSE

This procedure provides the methods by which SR's are acknowledged by the NOCC.

4.5.2 PARTICIPANTS

- a. NEDIC.
- b. ACON.

4.5.3 PROCEDURES

- a. Within three working days after the receipt of an SR, the NEDIC will send an SR Acknowledgement Message to the station originating the SR containing notification of the code assigned to take action and an approximate date by which an answer can be expected.
- b. If the original estimate of the time an answer will be provided is changed, the NEDIC will inform the station by teletype revising the date of the expected answer.

4.6 SUPPORT REQUEST ANSWER (SR ANS)

4.6.1 PURPOSE

The SR ANS provides the method by which the NOCC replies to SR's generated by the STDN.

4.6.2 PARTICIPANTS

- a. NEDIC.
- b. ACON.

4.6.3 PROCEDURES

- a. An SR answer will be processed through the NEDIC and routed to all stations indicated by the SR.
- b. The SR answer will include station designator, original SR No., the station SR DTG, the subject line of the original SR, and support identification code, if applicable.
- c. SR answers that do not completely answer the question will remain "OPEN" requiring another answer to close the SR and the text will reflect the "OPEN" condition.
- d. An SR answer will not be used to give operational direction.

4.7 SUPPORT REQUEST ADVISORY

4.7.1 PURPOSE

This procedure informs the STDN of the current outstanding SR's.

4.7.2 PARTICIPANTS

a. NEDIC.

b. ACON.

4.7.3 PROCEDURES

a. On the first Monday of each month, the NEDIC will prepare an SR Advisory Message to be transmitted to STDN stations.

b. This message will contain a list of the unanswered SR's and the actions assigned.

c. Upon receipt of an SR Advisory, the stations will compare it with on-station records and advise the NEDIC of any discrepancies.

4.8 REQUEST FOR INSTRUMENTATION CLARIFICATION (RIC)

4.8.1 PURPOSE

RIC's are used by the NTWK on premission and mission status to ask questions relating to equipment modifications, previously documented instructions, activities, testing, station configuration, or any other items pertaining to NTWK mission instrumentation.

4.8.2 PARTICIPANTS

- a. NOCC.
- b. ACON.

4.8.3 PROCEDURES

- a. A RIC may be generated by the AOCC, will contain "ONLY ONE SUBJECT", will pertain to a specific mission, and will be transmitted to the NOCC.
- b. A RIC may only be cancelled by another RIC.
- c. For a specific mission, RIC's are numbered sequentially by each station using three digits.
- d. All RIC's for a particular mission will be routed to supporting stations.
- e. All RIC's will receive an answer.
- f. Upon commencement of premission or mission status, the NOCC will convert all unanswered mission SR's to RIC's. Future RIC's from a station will be numbered sequentially beginning with the next appropriate number.

4.9 REQUEST FOR INSTRUMENTATION CLARIFICATION ANSWER (RIC ANS)

4.9.1 PURPOSE

The RIC ANS provides the method by which the NOCC replies to questions (RIC's) generated by the NTWK.

4.9.2 PARTICIPANTS

- a. NOM/NC.
- b. ACON.

4.9.3 PROCEDURES

- a. A RIC answer will originate through the NOM/NC.
- b. A RIC answer will not be used to give direction.
- c. The RIC answer must refer to the station, the RIC number, the DTG, support identification code, and subject line to which the answer applies.
- d. RIC answers that do not completely answer the question will remain "OPEN," requiring another answer to close the RIC, and the text will reflect the "OPEN" condition.
- e. Outstanding mission SR's which have been converted to RIC's will include the original SR identification and text in the RIC ANS. Future RIC's from the station will be numbered sequentially beginning with the next appropriate number.

4.10 OPERATIONS MESSAGE (OPN)

4.10.1 PURPOSE

The OPN is used during nonmission, premission, or mission periods to transmit operational information when existing teletype formats are not applicable.

4.10.2 PARTICIPANTS

- a. NOCC.
- b. ACON.
- c. Project.

4.10.3 PROCEDURES

- a. An OPN may be addressed TO or FM NOCC, the AOCC, or Project.
- b. OPN's are issued to furnish information of a general nature. OPN's will not be used to give direction, or to correct or modify mission documentation and configuration.
- c. When applicable to a specific mission, the OPN will contain the support identification code.

4.11 DOCUMENTATION CHANGE NOTICE (DCN)

4.11.1 PURPOSE

DCN's are issued as permanent changes to documentation.

4.11.2 PARTICIPANTS

- a. NEDIC.
- b. ACON.
- c. NASA line organization.

4.11.3 PROCEDURES

- a. DCN's written for a specific document are numbered consecutively beginning with 001, and when that document is updated by printed change or revision, the DCN numbers are recycled to 001.
- b. DCN's may originate from a NASA line organization or from the NOCC.
- c. All teletype DCN's will be transmitted by the NOCC and may contain a point of contact for questions.
- d. DCN's are distributed by teletype or by printed page.

4.12 DOCUMENTATION ADVISORY

4.12.1 PURPOSE

This message provides the NTWK with a method of verifying the latest changes to specific mission documentation (TSI's, ISI's, DCN's, transmitted or in preparation, and RIC status).

4.12.2 PARTICIPANTS

- a. NEDIC.
- b. ACON.

4.12.3 PROCEDURES

- a. During premission or launch and early orbit, the Documentation Advisory Message will be prepared by the NEDIC and transmitted to the supporting stations twice a month. During orbital phase, the advisory message will be transmitted monthly; during manned missions, it will be transmitted daily.
- b. Documentation Advisory Messages will be numbered consecutively for each mission, beginning with 001.
- c. Upon receipt, stations will correlate the information and advise the NEDIC concerning any discrepancies.

4.13 DCN MONTHLY SUMMARY REPORT (ALL DOCUMENTS)

4.13.1 PURPOSE

This procedure defines the method by which the NOCC notifies the STDN, and those receiving documentation distribution, concerning all the DCN's distributed during the preceding month.

4.13.2 PARTICIPANTS

- a. NEDIC.
- b. ACON.

4.13.3 PROCEDURES

- a. No later than the third day of each month, a teletype message will be transmitted to the STDN.
- b. The summary will contain the following:
 - (1) The documentation series number, title, and date of issue of each document changed by DCN; the DCN number, the DTG of each DCN, and the stations to which they apply.
 - (2) The DTG of the previous summary.
- c. Upon receipt of the DCN monthly summary report, stations will compare the summary with on-station records and notify the NEDIC of any discrepancies.

4.14 DOCUMENTATION REVIEW MESSAGE

4.14.1 PURPOSE

This message is used to advise the NTWK to review mission support material required on station for support of a specific mission.

4.14.2 PARTICIPANTS

- a. NEDIC.
- b. ACON.
- c. NASA line organization.

4.14.3 PROCEDURES

This message is generated by the NEDIC from information furnished by a NASA line organization, and will generally refer to a published Documentation Briefing Report (DBR). Responses to this station-conducted review will be made by transmitting a Documentation Confirmation Message.

4.15 DOCUMENTATION CONFIRMATION MESSAGE

4.15.1 PURPOSE

This procedure provides the methods for confirming the receipt of required mission documentation or data and for notification of missing items.

4.15.2 PARTICIPANTS

a. NEDIC.

b. ACON.

4.15.3 PROCEDURES

Within 48 hours, or two working days, of the receipt of a Documentation Review Message, the AOCC will transmit a Documentation Confirmation Message to GCEN/NOCC to confirm the receipt of all documentation or data or indicate the missing items. Subsequently, when missing mission documentation or data is received, the AOCC will transmit an updated Documentation Confirmation Message to GCEN/NOCC.

4.16 ARIA PECULIAR DOCUMENTATION

4.16.1 AFETR OPERATIONS ORDER FOR ARIA SUPPORT OF APOLLO

The ARIA Operations Order contains the detailed plan for ARIA support of a given mission. The following general areas are covered:

- a. Basic Plan. Outlines support requirements and gives concepts and instructions for execution of the plan.
- b. Annex A. Outlines mission support with required special procedures and flight-following information.
- c. Annex B. Outlines the communications facilities that are available for command and control purposes when the ARIA are in-flight during deployment and are on the ground at designated staging and/or recovery bases.

4.16.2 AFETR RANGE INSTRUMENTED AIRCRAFT COMMUNICATIONS PLAN

The ARIA Communications Plan contains communications requirements, procedures, and operational concepts which are deemed necessary for the ARIA to support manned and unmanned NASA and DOD missions.

4.16.3 AIRCRAFT OPERATIONS PROCEDURES

The Aircraft Operations Procedures is an outline of the overall functions of the Airborne Instrumented Aircraft and the Aircraft Operations Section describing the supporting facilities with position functions, responsibilities, and operating procedures during all phases of mission activities. The following general areas are covered:

- a. AOCC Procedures. Outlines procedures for each operating position by mission phase for daily operations, DOD mission operations, and NASA mission operations.
- b. Appendices. Provides detailed information necessary for operations on all mission phases such as message formats, documentation lists, forms, reports, etc.

4.16.4 ARIA SIMULATION HANDBOOK

The ARIA Simulation Handbook contains operation concepts and procedures to be used by ARIA personnel when conducting simulations of the following general types:

- a. AOCC SIM (in-house, no aircraft): NCG-225.
- b. AOCC/ARIA SIM (in-house, with aircraft): NCG-147, 226, 227, 660, and 675.
- c. AOCC/GSFC SIM (with and without aircraft): NCG-001 (plus mission number).
- d. AOCC/STDN SIM (with and without aircraft): NCG-231, 232 and 233.

Twenty-one simulation variations are described in detail. Procedures to be used by AOCC and ARIA personnel, as well as by the SIM team, are provided. Equipment and personnel requirements are included.

SECTION 5. COMMUNICATIONS

5.1 ARIA COMMUNICATIONS

5.1.1 AIRCRAFT SUPPORT

The provisions of the AFETR Range Instrumented Aircraft Communications Plan apply.

5.1.2 HF COMMUNICATIONS

HF communications may be augmented by use of TACSAT in support of voice relay functions. TACSAT employment will depend upon TACSAT schedules and availability of terminals aboard the ARIA.

5.2 PRIMARY RECOVERY SHIP SUPPORT

5.2.1 GENERAL

Dependent on the scheduled Apollo mission profile, the position of the Primary Recovery Ship (PRS) in the South Pacific Ocean area, and the need for support, an alternate HF communications route may be made available by use of the ground stations at Sydney, Australia and interconnect circuitry.

5.2.2 RESPONSIBILITIES

5.2.2.1 HF Ground Station, Sydney, Australia. The equipment and personnel necessary to conduct the primary ARIA function of air-to-ground communications are under contract to NASA, GSFC. Interconnect circuitry to Hawaii is made available by NASA. The DOD is responsible for the effectiveness of air-to-ground communications and for the proper allocation of the interface circuits to secure maximum use of limited resources.

5.2.2.2 ARIA Network Communications. The ARIA Communications Controller (ARIA ComTech) at Cape Kennedy has direct control of all communications committed to support the ARIA network.

a. The ARIA ComTech at Wheeler AFB responds to the directions of the Cape ARIA ComTech.

b. The ARIA ComTech at Sydney responds to the directions of the Wheeler ARIA ComTech or Cape ARIA ComTech, depending on the current mission phase.

5.2.2.3 PRS Communications. Communications to and from the PRS are under the control of the Commander, Task Force 130 (CTF-130), Kunia, and his communications representatives (Pacific Radio). All actions pertinent to PRS communications must be cleared through Pacific Radio.

5.2.2.4 MSC, Houston. Coordination needed to ensure the availability of communications for the ARIA and the PRS during critical phases of an Apollo mission or during periods when the Sydney HF station is needed for support of the PRS, is the responsibility of the DOD Manager and his communications representative (Houston OSBORN).

5.2.3 PROCEDURES

5.2.3.1 The ARIA communications network will normally be activated at F-10 days and qualified for mission support by the Cape ARIA ComTech. The detailed configuration and operational procedures are contained in AFETR Communications Plan.

5.2.3.2 When determined, by CTF-130, that the Sydney HF station is needed for an alternate route to PRS, the following applies:

- a. Pacific Radio will request Sydney support from Houston OSBORN.
- b. Houston OSBORN will coordinate with the Cape ARIA ComTech, and if the ARIA are not being used for simulations, TLI support, or reentry support, changes in circuit configuration will be directed to the Wheeler ComTech from the Cape.
- c. In the event a conflict arises on need for the Sydney station and associated interconnect circuitry for PRS support, resolution will be made at the RCC, Houston, through coordination with the DOD Manager, ARIA representatives at the AOCC, Patrick AFB, and CTF-130.
- d. Sydney support to the PRS will consist of one voice circuit and use of the teletype orderwire.
- e. The interface of circuits to CTF-130 from Wheeler AFB will be made through NAVCOMSTA, Hawaii.
- f. NAVCOMSTA, Hawaii, will perform the function of net control during periods when these circuits are activated for PRS support, and the Sydney station will respond to NAVCOMSTA directions. CTF-130 (Pacific Radio) exercises management control to ensure effectiveness of support to the PRS, and NAVCOMSTA responds to Pacific Radio requirements.
- g. Upon determination that PRS support is no longer required, Pacific Radio will advise Houston OSBORN who will take actions needed through the Cape ARIA ComTech to restore the network to normal configuration.
- h. If during the period the Sydney station is supporting the PRS, a condition arises which requires the Sydney station to return to an ARIA configuration, the Cape ComTech will advise Houston OSBORN of his requirements. Houston OSBORN will coordinate with the DOD Manager, Houston ARIA rep., and CTF-130 to return Sydney to normal ARIA configuration. Pacific Radio will advise his terminals to cease operations and clear the network expeditiously.

5.3 TACSAT COMMUNICATIONS

5.3.1 ARIA REAL-TIME TELEMETRY COMMUNICATIONS

The normal ARIA Communications Network will be operational during the real-time data/voice tests from ARIA via TACSAT on CADFISS tests, and again during TLI coverage on launch day. A TACSAT terminal will also be operational in the western USA with a connecting voice link to the Cape ARIA ComTech. Schedules for satellite access time, TACSAT ground terminal manning, and ARIA ComTech manning have been issued to cover both real-time periods.

5.3.2 COMMUNICATIONS CONFIGURATION

5.3.2.1 The AFETR ARIA Communications Plan (CP 71-1) describes the ARIA HF communications network and operating procedures. Figure 5-1 shows the TACSAT communications configuration to be used for the real-time tests. ARIA will downlink the data and voice to a network station via TACSAT during the CADFISS test and during mission coverage. The separated downlink voice will be extended from the network station to the Cape ComTech via existing network voice circuits provided by the DOD/GSFC. The wideband data will be extended to GSFC via existing network circuitry.

5.3.2.2 For support of this test during the mission, the Net 3 circuits to the network station and AOCC will be taken out of conference at TLI-60 minutes and extended to NST ARIA using a designated SCAMA drop to NOCC. This configuration will also be established during the CADFISS testing on F-2 day. The CADFISS Test Conductor will be included at that time. A direct HF circuit from ARIA to the network station will also be used during CADFISS testing. This configuration will be discontinued, in each case, upon notification by the NOM.

5.3.3 COMMUNICATIONS PROCEDURES

Uplink voice to ARIA via TACSAT will be through the TACSAT ground terminal in the western USA. Both uplink and downlink voice with the other ARIA (within view of the satellite) during TLI/reentry will also be through the ground TACSAT terminal. Normal HF communications will be maintained with each ARIA.

5.3.4 CONFIGURATIONS FOR SPACECRAFT VOICE RELAY

5.3.4.1 Configuration No. 1. The ARIA will down-link spacecraft voice by HF radio and real-time telemetry plus 70 kHz voice link via TACSAT. Up-link voice from CapCom will be by HF radio and TACSAT.

5.3.4.2 Configuration No. 2. The ARIA will down-link spacecraft voice by HF radio only. Real-time data will be down-linked via TACSAT with 70 kHz voice switched off. Up-link voice from CapCom will be by HF radio and TACSAT.

5.3.4.3 Procedures

- a. The Cape ComTech with approval of ARIA Control will determine which of the above configurations will be used by each ARIA during their respective support periods.
- b. During the voice checks at about H-60 minutes, both configurations No. 1 and No.2 will be checked, at this time the ARIA will be given a tentative support configuration.
- c. Configuration No. 2 will be the preferred configuration, but will be used only if the HF radio circuit is of excellent spacecraft voice quality.
- d. After the H-60 test the Cape ComTech will immediately report any change required in configuration to the appropriate ARIA MC. The start of pass configuration will be confirmed to appropriate ARIA at AOS -2 minutes. This configuration will be used throughout the pass unless changes are noted in transmission conditions. If conditions demand, the configuration may be changed at the discretion of the Cape ComTech.
- e. The AOCC will advise the NST ARIA and the network station of any changes in configuration after the H-60 checks.

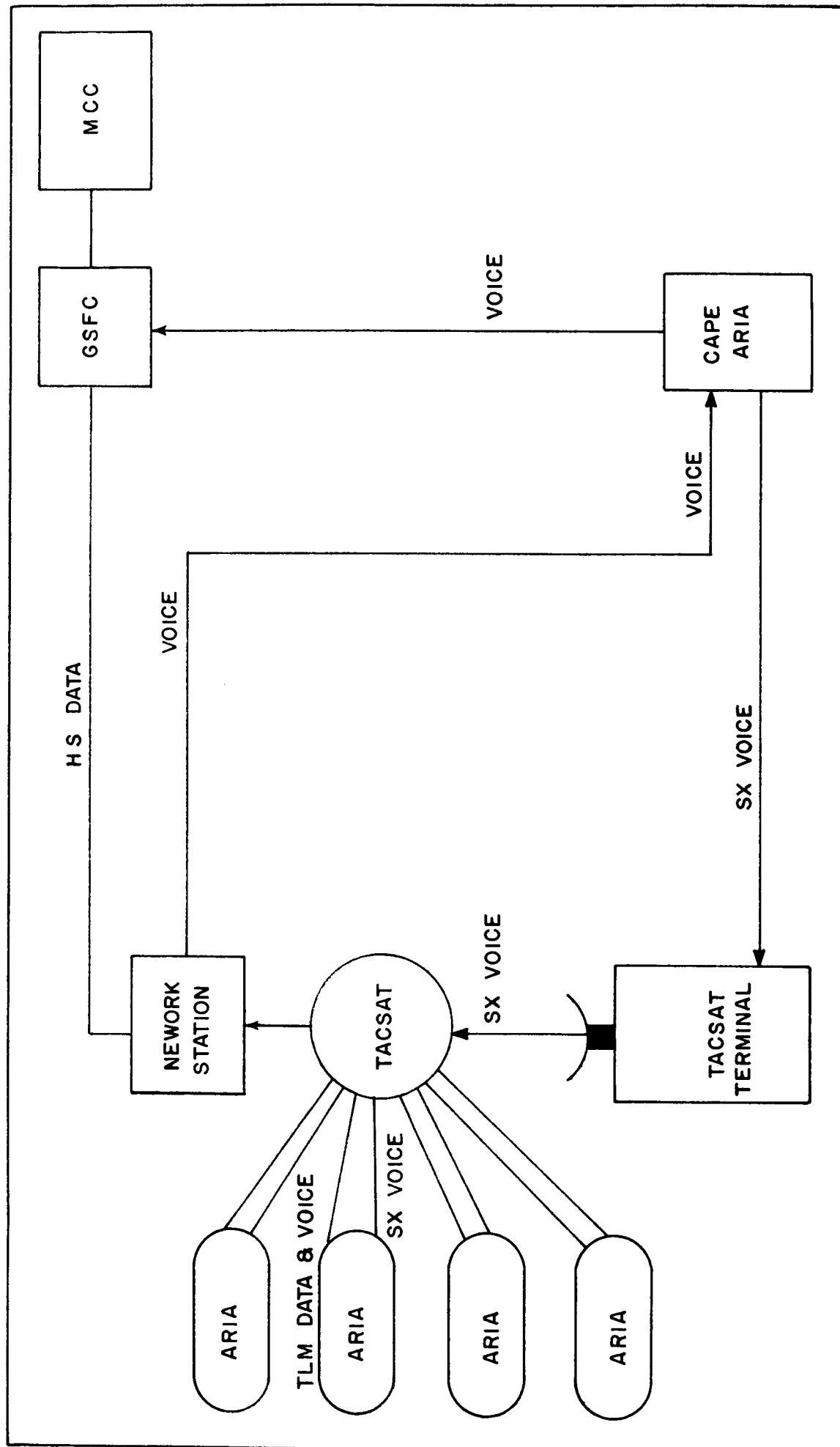


Figure 5-1. TACSAT Communications Configuration for Real-time TLM

SECTION 6. SCHEDULING

6.1 GENERAL

The scheduling procedures contained in this section describe the methods by which the NOCC and AOCC activities are forecast and scheduled.

6.1.1 The scheduled week will begin at 0000Z Tuesday and extend seven days to the following Monday at 2400Z.

6.1.2 The scheduled day will begin at 0000Z and end at 2400Z of the GMT day.

6.1.3 Support items or events extending across the scheduled day or week change will always appear on the day the scheduled support starts. If the duration of the previous day's event extends into the new GMT day by 30 minutes or less, the schedules will reflect it only in the day in which the support started. However, if the support extends into the new GMT day more than 30 minutes, the support will be scheduled as a segmented function and will appear on the schedules for both days. The stop time for the ending day and start time for the beginning day will be 2400Z and 0000Z, respectively. The general remarks area will carry an identification indicating the support is segmented.

6.2 NETWORK OPERATIONS SCHEDULE

6.2.1 PURPOSE

The network operations schedule provides the AOCC with a seven-day (Tuesday 0000Z through Monday 2400Z) schedule for which support commitments have been made.

6.2.2 PARTICIPANTS

- a. NESAC (Network Scheduling Activity Controller).
- b. ACON.

6.2.3 PROCEDURES

- a. Starting each Thursday at 2000 GMT, the NOCC will transmit the network operations schedule.
- b. Each station will receive a schedule containing only that station's support commitments.
- c. Each schedule entry will include:

(1) Event Schedule Entries:

- (a) SUPIDEN (Maximum Seven Characters). The support identification code.
- (b) START (Six Numeric Characters). Start time of a support (i.e., RCDR ON, Interrogate STRT, Zenith crossing).
- (c) STOP (Four Numeric Characters). Stop time of a support (i.e., RCDR OFF, Interrogate STOP).
- (d) IFCD (Four Characters). Interface code, the IFCD describes the prepass set-up time, the start of a station's external interface, the stop of a station's external interface, and the stop postpass activities.
- (e) RTCONF (Six Characters). Configuration code. This code indicates the gross configuration requirements for the scheduled support and an indication of the preferred receive and transmit systems.
- (f) REMARKS (33 Characters). Remarks include supplemental information.

(2) Communication Line Schedule Entries:

- (a) STRT (4 characters). Start of communications requirement.
- (b) STOP (4 characters). Stop of communications requirement.
- (c) REMARKS (40 characters). The type lines and the participants other than the stations.

Note

A code dictionary will be supplied.

6.3 SCHEDULE UPDATE MESSAGE PROCEDURE

6.3.1 PURPOSE

This procedure defines the methods by which the operations schedule may be modified.

6.3.2 PARTICIPANTS

a. NESAC.

b. ACON.

6.3.3 PROCEDURES

a. The NESAC will prepare network schedule update messages to the current operations schedule as changes are required.

b. Each station will receive schedule update messages containing only that station's support commitment changes.

c. The schedule will be modified using the same format as the operations schedule by adding a new activity and/or deleting a schedule entry.

6.4 STATION SCHEDULE REQUEST PROCEDURES

6.4.1 PURPOSE

This procedure provides the methods for requesting the scheduling of ARIA activities and downtime.

6.4.2 PARTICIPANTS

- a. NESAC.
- b. ACON.

6.4.3 PROCEDURES

- a. The AOCC may request time to be scheduled for station activities by submitting a teletype request to the NOCC.
- b. Requests will contain the following information as appropriate:
 - (1) Activity identification.
 - (2) Dates and times.
 - (3) Station designator.
 - (4) Equipment affected.
 - (5) Operations affected.
 - (6) Test description/reference document/remarks.
- c. Requests should be received by the NOCC prior to 1200 GMT on the Monday 7-1/2 days prior to the beginning of the scheduled week to which the request applies.
- d. Requests received by GCEN/NOCC later than the deadline must contain an explanation concerning the urgency or necessity for the requested support.

6.5 NON-PARTICIPATION REQUEST PROCEDURES

6.5.1 PURPOSE

This procedure is designed to provide a method by which the AOCC may request non-participation in a scheduled activity.

6.5.2 PARTICIPANTS

- a. NESAC.
- b. ACON.

6.5.3 PROCEDURES

- a. The AOCC will transmit a teletype request to GCEN/NOCC.
- b. All requests must contain the following information:
 - (1) Activity identification (from schedule).
 - (2) Scheduled support times (from schedule).
 - (3) Explanation of request.

7.1 PROBLEM REPORTING

7.1.1 PURPOSE

This procedure establishes the method by which a station supplies information to the NOCC concerning station problems with scheduled operations. This is the station input to describe the cause, effect, and resolution of station problems, with scheduled operations such as equipment failures, operator errors, or station operational anomalies.

7.1.2 PARTICIPANTS

- a. NOCC.
- b. ACON.

7.1.3 PROCEDURES

- a. The NOCC may request the ACON to submit a problem report message. The ACON has the option to submit a problem report message at any other time that, in his opinion, it becomes necessary.
- b. Each report will contain problems from only one scheduled operation. When a subsequent message is transmitted which refers to a previous problem report, specific reference will be made to the previous report DTG(s).
- c. Problem report messages requested by the NOCC require that the ACON take action as soon as possible. If details are not immediately available, the problem report will contain as much information as possible. The ACON will transmit a follow-up problem report message as soon as the missing details concerning the cause or resolution of the problem become available.
- d. The problem report will refer to information provided in other reports by DTG (e.g., ESR, PASSUM, TOR).
- e. The problem report message format is contained in section 8. No additional personnel or addresses are to be included in the routing of the message unless specified by the NOCC.

7.2 RADIO FREQUENCY INTERFERENCE (RFI) REPORTING

7.2.1 PURPOSE

This procedure describes the methods for reporting RFI.

7.2.2 PARTICIPANTS

- a. NOD/NOM.
- b. ACON.
- c. Project.

7.2.3 PROCEDURES

- a. Classification of RFI. RFI is limited to interference existing on frequencies used for communication and instrumentation in the operations of spacecraft and stations during a scheduled support activity. An RFI report will include the emission type, signal strength, and frequency experiencing the interference.
- b. Local Control. The AOCC is authorized to coordinate with local authorities to minimize the possibility of RFI to ARIA systems. The ACON may request assistance from the Eastern Area Frequency Coordinator (AFC) through either the NOM or the Range Frequency Coordinator/Manager for the resolution of DOD-caused interference. The AFC may be contacted at Patrick Air Force Base, Florida, telephone (305) 494-4208, or AUTOVON 485-4208 during duty hours.

7.2.4 STATION RFI REPORTING

AOCC personnel must determine if RFI is of sufficient magnitude or duration to degrade the performance of station transmitting or receiving systems. If it is determined that harmful interference exists, the AOCC will use the following reporting procedures:

- a. Permission and Mission Periods. In the event of complete data loss during a pass or upon request, stations will report RFI to GCEN/NOCC with INFO to GSTS Code 509. All harmful RFI will be reported in applicable operational reports (i.e., PASSUM's, Daily Tracking Reports).
- b. Manned Mission Period
 - (1) The NOM will function as the central point of contact for all reported interference to frequencies used during mission operations, except as noted in paragraph (7.2.4b(3)).
 - (2) The NOM will forward all reports of RFI to Project. If Project determines that mission objectives may be jeopardized, he will request the NOM to identify the source and resolve the interference.
 - (3) When the AOCC interfaces directly with Project, detrimental RFI occurring during a pass will be reported verbally to the Project.

7.3 STATION POSTMISSION REPORT (MMR)

7.3.1 PURPOSE

This procedure provides the guidelines for preparing an MMR.

7.3.2 PARTICIPANTS

- a. NOM.
- b. AOCC.

7.3.3 PROCEDURES

- a. The MMR informs GSFC of problems concerning the mission support activities and procedures, and the general documentation encountered during the support period.
- b. All participating stations will transmit an MMR following termination of the launch and early orbit phase for unmanned missions, and termination of mission support for manned missions.
- c. MMR's will be transmitted within 48 hours (two working days) after mission support termination.

7.4 AOCC EQUIPMENT STATUS REPORT (ESR)

7.4.1 PURPOSE

This procedure establishes the method by which AOCC/ARIA will report the maintenance and status of equipment. These reports will be used to determine AOCC/ARIA support capability.

7.4.2 PARTICIPANTS

- a. NST.
- b. NESAM (Network Status and Activity Monitor).
- c. AOCC.

7.4.3 PROCEDURES

7.4.3.1 Reporting Definitions

- a. Red. A system or subsystem will be designated as "Red" when it is not operational.
- b. Yellow. A system or subsystem will be designated as "Yellow" when the status of the equipment is limited either because of nonstandard parts and configurations or because the required operating personnel are not available.
- c. Blue. A system or subsystem will be designated as "Blue" when the equipment is down for preventive maintenance (PM) or is down for the installation of an engineering change (EC). When the equipment is not available for operations due to instructions from Goddard it should be reported "Blue."
- d. Green. A system or subsystem will be designated as "Green" when the equipment is operational in its normal documented configuration and capable of meeting all scheduled support requirements.

7.4.3.2 Non-reporting Definition. Reports will not be required for any equipment which a station has been specifically instructed neither to operate nor maintain.

7.4.3.3 System Categories. When reporting a Red, Yellow, or Blue status, ACON will describe the malfunction as affecting one of the systems and subsystems contained in the following list:

- a. Aircraft general.
- b. Data transfer system.
- c. Tracking antenna.
- d. Telemetry receivers (A thru G).
- e. Tracking receivers (1 thru 4).
- f. USB voice.
- g. VHF voice.
- h. HF.

- i. Teletype.
- j. Timing.
- k. Recorders.
- l. Test equipment.
- m. Power and cooling.

7.4.3.4 ARIA ESR Reporting

a. Initial Status. The AOCC will transmit an initial ARIA ESR at first scheduled reporting time after receipt of ISI 001. This report will list the ARIA Pre-mission Calibration (PMC) schedule.

b. Subsequent Status Reports

(1) The AOCC will submit an ESR for each aircraft when PMC has been completed (at approximately F-10 days). Daily ESR's are not required except when there is a change in status.

(2) Beginning at F-3 days, the AOCC will give verbal ESR's, followed by teletype messages, on all items going Red/Yellow with a follow-up message when they become Green. Each ARIA's equipment problems will be reported in one message. During the terminal count, the AOCC will provide ESR's as required by the mission countdown.

(3) Unless they are Red and unable to support mission requirements, the deployed ARIA are only required to report once daily, shortly before the Daily ESR is compiled. Therefore, the Daily ESR will constitute the complete status of the ARIA. Teletype Status Updates will be submitted only for items going Red/Yellow and Red/Yellow items reported on the previous Daily ESR going Green.

c. Real-time Status. ARIA will pass a real-time status report to AOCC after completion of inflight checks and not later than H-10 minutes. This report will include Red/Yellow items and an estimation of ARIA ability to support at the designated TSP. AOCC will transmit this status on the ARIA Coordination Loop to the NC/NOM.

d. Liftoff Through Termination. After liftoff and until termination of the mission, the AOCC will send a Daily Status Report by TTY prior to 1600 Local.

7.5 ADVERSE WEATHER REPORTING

7.5.1 PURPOSE

This procedure defines the methods for reporting adverse weather conditions.

7.5.2 PARTICIPANTS

- a. NOD.
- b. AOCC.

7.5.3 PROCEDURES

- a. The AOCC/ARIA experiencing or anticipating adverse weather conditions will transmit an Adverse Weather Report Message to GCEN/NOCC. The message will contain:
 - (1) A report on the current adverse weather condition which could affect the aircraft's support capabilities.
 - (2) Details of the condition (when the information is available) such as time and duration, wind velocity, rainfall, or extent of flooding.
- b. The AOCC will transmit an Adverse Weather Update Message to GCEN/NOCC as soon as the adverse weather condition has ceased.

7.6 POSTLAUNCH COMPOSITE RADIO FREQUENCY CHANGE REPORTING

7.6.1 PURPOSE

This procedure defines the methods for reporting postlaunch CRF changes.

7.6.2 PARTICIPANTS

- a. NOM.
- b. ACON.

7.6.3 PROCEDURES

The ACON will notify the NOM whenever a spacecraft anomaly is detected which, in the opinion of station personnel, may affect network support. Typical conditions which must be reported include the following:

- a. VHF/TLM. In the event VHF/TLM frequencies exceed the tolerances listed in the mission supplements, or differ by that tolerance from the latest CRF, the ACON will transmit a CRF message to all participating stations and advise the NOM by voice.
- b. Incorrect CRF Message. In the event the AOCC transmits an incorrect CRF teletype message, the ACON will verbally inform the NOM and transmit a correct teletype CRF message as soon as possible. This procedure is not required if an updated CRF has been transmitted by a succeeding station.

Note

The NOM will ensure that the AOCC is aware of CRF changes when the CRF message may arrive later than H-5.

7.7 AOCC MANNING STATUS NOTIFICATION

7.7.1 PURPOSE

This procedure provides the AOCC manning condition to the NOCC, when requested.

7.7.2 PARTICIPANTS

- a. NOM/NC.
- b. ACON.

7.7.3 PROCEDURES

- a. The ACON will transmit a Station Manning Status Message to the designated NOCC addressee.
- b. This message will be transmitted at the start of station readiness preparation for support of an activity.

SECTION 8. TELETYPE MESSAGE FORMATS AND PROCEDURES

8.1 GENERAL

This section provides specific formats to be used for transmitting messages, data, and information between the NOCC and the Network by teletype.

8.1.1 TELETYPE MESSAGE PREPARATION PROCEDURES

Printed forms are available and are to be used in preparing a teletype message to be transmitted by the NOCC Communications Center or by the teletype operators at the AOCC. The originator is responsible for preparing the teletype message and the information required for proper transmission to the intended parties. Before it is transmitted, a copy of the final message may be delivered to the originator for his approval.

8.1.2 FORMATTING OF TELETYPE MESSAGES

All teletype messages will be formatted in accordance with the procedures established in the following paragraphs of this document, or by the procedures defined in mission documentation. Printed forms for many of the particular message categories are available to assist in the preparation of teletype messages.

8.1.3 HEADER INFORMATION

The preparation of header information is described in the following general procedures.

8.1.3.1 Line 1. The following applicable precedence indicators and the Routing Indicators denoting the distribution desired are placed in this first line of the header:

- a. Precedence Indicator UU is the highest possible precedence and is to be used only in extreme cases of emergency.
- b. Precedence Indicator SS is the designation used for special messages during mission periods and will be handled ahead of all messages except those designated by UU.
- c. Precedence Indicator PP is used to indicate a priority for transmission and handling as soon as possible.
- d. Precedence Indicator RR is used to indicate that the message does not require critical handling or immediate action, and will be used for most nonmission messages.
- e. Precedence Indicator NN is similar to RR except that it is used for regular handling of messages during mission periods.

Note

1. Routing indicators for Project will be supplied in the applicable mission documentation.
2. Table 8-1 lists the Network Directorate Codes and Routing Indicators.

8.1.3.2 Line 2. This line will contain the operating abbreviation "DE" which indicates that the message is originated from the station whose indicator follows.

8.1.3.3 Line 3. This line will contain the DTG in GMT indicating the start of the message preparation.

8.1.3.4 Line 4. This line will contain the operating abbreviation "FM" which indicates the person, code, or designator originating the message. Generally, this designation will be the office, position, or code of the originator. If a name is required, only the last name will be used unless the first name or initial is required to ensure identification of the originator.

8.1.3.5 Line 5. This line will contain the operating abbreviation "TO" followed by the designations of the addressees who will take action in accordance with the message text. If a name is required, only the last name of the addressee will be used unless the first name or initial is needed for identification.

8.1.3.6 Line 6. This line will contain the operating abbreviation "INFO" to indicate indicate the designations which are to receive a copy of the message for information purposes rather than action. If a name is required, only the last name of the addressee will be used unless the first name or initial is needed for identification.

8.1.4 SUBJECT LINE

This line follows the message header lines, precedes the text, and is used as directed by the applicable message formats or to explain the action to be taken. A subject line is not required in those message formats which either do not prescribe a subject line or in which the contents have been prescribed by a text explanation.

8.1.5 TEXT

This document contains specific formats for particular messages. Other formats will be defined in applicable mission documentation; otherwise, the text will be a succinct statement of the purpose of the message.

8.1.6 END OF MESSAGE

The end of the message is always designated by a File Time (DTG) in GMT indicating the time the preparation of the message was completed. This notation will serve as an additional source of identification for a specific message.

8.1.7 MESSAGE PRECEDENCE LEVELS DURING MISSION ISOLATION PERIODS

The teletype formats in this section may indicate a choice in message precedence levels. During Mission Isolation periods, the precedence indicators NN, SS, and UU may be selected. The Mission Isolation period is established either by the terminal count or by verbal directions. Mission Isolation is in effect for the duration of the mission support.

8.1.8 MESSAGE PRECEDENCE LEVELS DURING NONMISSION PERIODS

The teletype formats in this section may indicate a choice in message precedence levels. During nonmission periods, the precedence RR, PP, and UU may be used. However, if a Mission Isolation period has been established, use of these nonmission precedence levels (other than UU) is prohibited for simulation or mission teletype messages.

Table 8-1. Network Code and Routing Indicators

Code	Office/Title	Routing Indicator
800	Office of the Director of Networks	GSTS
801	Requirements and Plans Office	GSTS
802	International Affairs Office	GSTS
805	TDRSS Study Office	GSTS
810	Network Engineering Division	GSTS
811	Antenna Systems Branch	GSTS
811.1	Radiation Systems Section	GSTS
811.2	Antenna Section	GSTS
811.3	Control Section	GSTS
811.4	Preamplifier Section	GSTS
812	Network Computer Systems Branch	GSTS
812.1	Computer Section	GSTS
812.2	Computer Systems Section	GSTS
812.3	Telemetry Systems Section	GSTS
812.4	Computer Peripheral Section	GSTS
813	RF Systems Branch	GSTS
813.1	Receiving Systems Section	GSTS
813.2	Transmitting Systems Section	GSTS
813.3	Unified S-band Section	GSTS
813.4	Goddard Range and Range Rate Section	GSTS
814	Data Handling and Display Branch	GSTS
814.1	Command Systems Section	GSTS
814.2	Timing Systems Section	GSTS
814.3	Display Systems Section	GSTS
814.4	Data Handling Systems Section	GSTS

Table 8-1. Network Code and Routing Indicators (cont)

Code	Office/Title	Routing Indicator
815	Tracking and Systems Integration Branch	GSTS
815.1	Tracking Systems Section	GSTS
815.2	Site Integration Planning Section	GSTS
815.3	Requirements Coordination Section	GSTS
815.4	Site Communications Section	GSTS
820	Network Facilities and Services Division	GSTS
820.1	Recording Systems Office	GSTS
821	Documentation Support Branch	GFDA
821.1	Documentation Services Section	GFDA
821.2	Production, Distribution, and Archiving Section	GFDA
822	Physical Plant Engineering Branch	GSTS
822.1	Planning and Construction Section	GSTS
822.2	Design and Plant Engineering Section	GSTS
823	Network Logistics Branch	GLOG
823.1	Operational Logistics Section	GLOG
823.2	Material Control Section	GLOG
823.3	Depot Management Section	GLOG
824	Installation and Integration Branch	GSTS
824.1	Implementation Section	GSTS
824.2	Site Engineering Section	GSTS
830	Network Computing and Analysis Division	GSTS
831	Advanced Systems Office	GSTS
832	Metric Data Branch	GSTS
832.1	Math Analysis Section	GSTS
832.2	Tracking Data Evaluation Section	GSTS

Table 8-1. Network Code and Routing Indicators (cont)

Code	Office/Title	Routing Indicator
832.3	Analysis Programming Section	GSTS
833	Data Operations Branch	GSTS
833.1	Network Data Operations Section	GSTS
833.2	Network Computing Operations Section	GSTS
833.3	Network Computing Support Section	GSTS
834	Network Computing Branch	GSTS
834.1	Program Applications Section	GSTS
834.2	Test and Evaluation Section	GSTS
834.3	Network Tracking Programming Section	GSTS
840	NASA Communications Division	GSTS
840.1	Communications Technical Office	GSTS
841	Communications Engineering Branch	GSTS
841.1	Projects Communications Engineering Section	GSTS
841.2	Computer Switching Systems Section	GSTS
842	Communications Operations Branch	GSTS
843	Communications Network Review and Analysis Branch	GSTS
844	Data Systems Branch	GSTS
844.1	High speed Data Systems Engineering Section	GSTS
844.2	Teletype Systems Engineering Section	GSTS
850	Network Operations Division	GSTS
850.1	Staff Office	GSTS
850.2	Network Test and Training Facility	GETC
851	Network Operations Control Branch	GSTS
851.1	Operations Control Section	GSTS
851.2	Network Resources Control Section	GSTS

Table 8-1. Network Code and Routing Indicators (cont)

Code	Office/Title	Routing Indicator
851.3	Support Configuration and Monitoring Section	GSTS
852	Systems Maintenance and Operations Branch	GSTS
852.1	Operations Test Section	GSTS
852.2	Data Systems Section	GSTS
852.3	Tracking and Acquisition Systems Section	GSTS
853	Station Services Branch	GSTS
853.1	Network Program Operations and Staffing Section	GSTS
853.2	Facilities Maintenance and Services Section	GSTS
860	Network Procedures and Evaluation Division	GTWL
861	Operations Planning Branch	GTWL
861.1	Advanced Operations Planning Section	GTWL
861.2	Operations Planning Section	GTWL
861.3	Network Support Section	GTWL
862	Network Simulations Branch	GTWL
862.1	Manned Mission Simulations Section	GTWL
862.2	Unmanned Mission Simulations Section	GTWL
862.3	Aircraft Operations Section	GTWL
863	Network Evaluation Branch	GTWL
863.1	Network Analysis Section	GTWL
863.2	Operations Assurance Section	GTWL
863.3	Performance Evaluation Section	GTWL

8.2 TELETYPE ROUTING INDICATORS

8.2.1 STATION ROUTING AND LOCATION

<u>Routing Indicator</u>	<u>Location</u>
ABMW	Australia - Tidbinbilla - Apollo Wing (Data only)
ACAB	Australia - Carnarvon - STDN Special Routing
ACRO	Australia - Carnarvon - STDN (CRO)
ACSW	Australia - Canberra Switching Center
AHSK	Australia - Honeysuckle Creek - STDN (HSK)
AMLM	Australia - Honeysuckle Creek - STDN Special Routing
ANBE	Australia - Tidbinbilla - DSS 42
ANRC	Australia - Canberra - Senior NASA Representative
APBA	Australia - Canberra - American Projects Branch
ASFA	Australia - Fyshwick A.C.T. - Network Support Facility
GACN	Ascension Island - STDN (ACN)
GALA	United States - Alabama - Huntsville - NASA George C. Marshall Space Flight Center and Green Mountain NASA Tracking Station
GBDA	Bermuda - Bermuda - STDN (BDA)
GCDF	United States - Greenbelt, Md. - Goddard - CADFISS (use only as directed)
GCEN	United States - Greenbelt, Md. - Network Operations Control Center (NOCC)
GCNV	United States - AFETR Cape Kennedy, Fla. - RTCS and ETR down range
GCQU	United States - Greenbelt, Md. - Goddard 360 Computers
GCTR	United States - Greenbelt, Md. - Network Operations Control Center (NOCC)

<u>Routing Indicator</u>	<u>Location</u>
GDCS	United States - Greenbelt, Md. - GSFC Real Time Computers
GDRO	United States - Greenbelt, Md. - NOCC Data
GETC	United States - Greenbelt, Md. - Engineering Training Center (STDN) & Network Test and Training Facility (NTTF)
GFDA	United States - Riverdale, Md. - Documentation Support Branch
GFMI	United States - Merritt Island, Fla. - STDN Special Routing
GGDS	United States - Goldstone, Calif. - STDN (GDS)
GGPM	United States - Goldstone, Calif. - STDN Special Routing
GKSC	United States - Hqtrs. John F. Kennedy Space Center (NASA) Merritt Island, Fla.
GLOG	United States - Greenbelt, Md. - GSFC Network Support Office
GMIL	United States - Merritt Island, Fla. - STDN (MIL)
GNNS	United States - Kennedy Space Center, Merritt Island, Fla. - GSFC Network Support Office
GPMB	Ascension Island - STDN - Special Routing
GSCP	United States - Greenbelt, Md. - GSFC Communications Switching Computer
GSPA	United States - Greenbelt, Md. - GSFC Operations/Service/Intercept/Advisory Area
GSRM	United States - Greenbelt, Md. - GSFC Special Refile Section
GSTS	United States - Greenbelt, Md. - Goddard Terminal Section and Refile Point
GTEX	United States - Corpus Christi, Texas - STDN (TEX)
GTIJ	United States - Corpus Christi, Texas - STDN Special Routing
GTWL	United States - Greenbelt, Md. - Tracking and Telemetry Laboratory

<u>Routing Indicator</u>	<u>Location</u>
GUDA	Bermuda - STDN Special Routing
GUNV	United States - Greenbelt, Md. - NOCC
GUPA	United States - Patrick AFB Florida - Air Force Eastern Test Range (AOCC & RANGE Control)
GWAB	United States - Wallops Island, Va. - Operations Control Center
GWMW	United States - Goldstone, Calif. - STDN Apollo Wing
GWTR	United States - Vandenberg AFB, Calif. - Space and Missile Test Center (SAMTEC) Communications Center
HACR	United States - Houston, Texas - Auxiliary Computing Room (Computer to Computer only)
HAGE	United States - Houston, Texas - Vehicle Systems SSR (LEM)
HALO	United States - Houston, Texas - Staff Support Room Collective
HANC	United States - Houston, Texas - ALSEP Network Control
HBOS	United States - Houston, Texas - Vehicles Systems SSR (Booster)
HDYN	United States - Houston, Texas - Flight Dynamics SSR
HENV	United States - Houston, Texas - Environmental Systems Console (WX Room)
HFOS	United States - Houston, Texas - Flight Operations Office (FOSO)
HGEM	United States - Houston, Texas - Vehicles Systems SSR (CSM)
HMCP	United States - Houston, Texas - Houston Commu- nications Processor (Service type traffic only) CCATS Command Load Control
HMSC	United States - Houston, Texas - Manned Space- craft Center
HNET	United States - Houston, Texas - Network Controller NC/CCATS

<u>Routing Indicator</u>	<u>Location</u>
HOPS	United States - Houston, Texas - Flight Director SSR
HRTC	United States - Houston, Texas - MCC-H Real- time Computer Center
HSIM	United States - Houston, Texas - Simulation Control
HSPO	United States - Houston, Texas - Apollo Spacecraft Program Office
JGLD	United States - Goldstone, Calif. - Deep Space Communication Complex (DSCC) Communications Center
JJPL	United States - Pasadena, Calif. - JPL (SFOF) DSN Communications Center and NASCOM West Coast Switching Center
JOCC	United States - Pasadena, Calif. - JPL (SFOF) DSN/OCC Operational Control
JPIR	United States - Goldstone, Calif. - DSS-11
LCKL	Grand Canary Island - STDN Special Routing
LCYI	Grand Canary Island - STDN (CYI)
LKMW	Spain - Madrid - STDN Apollo Wing
LLDN	England - London - Switching Center
LMAD	Spain - Madrid - STDN - GSFC Rep.
LDRO	Spain - Madrid - NASA/INTA Central Office NASA Rep. - INTA Rep. - DSN Rep.
LRID	Spain - Madrid - DSIF 61
LROB	Spain - Madrid - Switching Center
LZAA	Spain - Madrid - STDN Special Routing
MVAN	USNS Vanguard
PGMF	Marianas Island - Guam - STDN Special Routing
PGWM	Marianas Island - Guam - STDN (GWM)
PHAW	Hawaii - Kauai Island - STDN (HAW)
PHON	Hawaii - Honolulu - Switching Center
PHQR	Hawaii - Kauai Island - STDN Special Routing

8.2.2 COLLECTIVES

8.2.2.1 SDI-103C-DSDC

a. Routing Indicators

ACRO ACSW APBA AHSK ASFA GACN GALA
GBDA GCDF GCNV GETC GGDS GKSC GMIL
GNNS GSTS GTEX GUPA HMSC JJPL JOCC
JPIR LCYI LLDN LMAD LRID LROB MVAN
PGWM PHAW PHON

b. Action Addressees. As indicated in the message address.

c. Information Addressees

APBA/AMERICAN PROJECTS BRANCH
ASFA/NETWORK SUPPORT FACILITY
GALA/PM-MO-RC
GCNV/RTCS
GKSC/ALDS CIF TS-TSM-3
GSTS/CODE 833, 842
GUPA/ARCTO YZKEN DOOT CKAFS
GUPA/DDMS DOOP PAPP AOCC/PAFB
JJPL/P SMOR
JPIR/STAMGR
JJPL/JPL WEST COAST SWITCHING CENTER MANAGER
LRID/STAMGR

8.2.2.2 SDI-110J-DSDJ

a. Routing Indicators

ACSW ANBE AOMJ GKAP GKEN GSTS GTWL GUPA
JAME JCPS JECO JGLD JJPL JLAB JMAR JOCC
JPIR JSIM JTNC JZED LCEB LJOB LRID LROB

b. Action Addressees

ANBE/COMMSUPVR
AOMJ/COMMSUPVR
GKEN/COMMSUPVR
GSTS/SHIFT COMMGR
JAME/COMMSUPVR
JCPS/COMPUTER CHIEF
JECO/COMMSUPVR
JGLD/COMMSUPVR COMMCORD
JJPL/COMMCONTROL
JLAB/COMMSUPVR
JMAR/COMMSUPVR
JPIR/COMMSUPVR
JSIM/COMMSUPVR
LCEB/COMMSUPVR
LJOB/COMMSUPVR
LRID/COMMSUPVR

c. Information Addressees

ACSW/WESTBROOK
GKAP/COMM SUPERVISOR
GSTS/CASSELS CODE 842 STEWART 841
GTWL/R GREENE CODE 861.2
GUPA/KKKN CKAFS
JJPL/COLLINGE DUNBAR MEYER
JOCC/(SFOF) DSN OC
JTNC/(SFOF) DSIF CONTROL
JZED/DSN MONITOR CHIEF
LROB/FIGUEROA

8.2.2.3 SDI-111K-DSDK

a. Routing Indicators

ACRO AHSK GACN GBDA GCTR GGDS GMIL

GSTS GTEX GUPA HMSC JPIR LCYI LMAD

LRID MVAN PGWM PHAW

b. Action Addressees. As indicated in the message address.

c. Information Addressees

GSTS/CODE 833, 834, 841, 842

GUPA/ARCTO CKAFS

GUPA/DDMS PAFB

JPIR/STAMGR

LRID/STAMGR

8.3 TELETYPE MESSAGE FORMATS

The remainder of this section contains specific teletype formats, message examples, and text explanations.

8.4 ACKNOWLEDGEMENT MESSAGE

An Acknowledgement Message is transmitted by the addressee to the originating station of any teletype message which requires confirmation that the message has been received and understood. Messages with a UU precedence always require an acknowledgement.

8.4.1 PRECEDENCE

Use the precedence level of the message being acknowledged.

8.4.2 ROUTING INDICATORS

Originating station

8.4.3 CLASSIFICATION

ACK

8.4.4 EXAMPLES

a. Message Requiring an Acknowledgement

SS GBDA
DE GCEN 022A
12/1650Z
FM NOM
TO GBDA/RADAR

SPE E0018 MR ACK

DO NOT/NOT CONNECT PIN NR. J11 TO PIN NR. P78 AS STATED IN EI 2234.

EQUIPMENT DAMAGE MAY RESULT. ISI NR. 9 WILL RESOLVE THIS.

12/1652Z AUG 71 GCEN

b. Acknowledgement Message

SS GCEN
DE GBDA 013
12/1700Z

ACK SPE 12/1650Z

12/1701Z AUG 71 GBDA

8.4.5 TEXT EXPLANATION

Text is self-explanatory.

8.5 DATA SHIPMENT ADVISORY

This message is used to verify data shipments. Detailed procedures are described in the mission supplements, DCN's and ISI's.

8.5.1 PRECEDENCE

RR NN

8.5.2 ROUTING INDICATORS

GFDA GTPC GTWL

8.5.3 CLASSIFICATION

DATA SHIPMENT ADVISORY

8.5.4 EXAMPLE

RR GFDA GTPC GTWL
DE ACRO 046A
18/2145Z
FM OPSR
TO GTWL/CODE 861.1
INFO GFDA/DSS
GTPC

DATA SHIPMENT ADVISORY

1. CRO-VOUCHER NR 710127
2. 18 DEC 1971
3. NASA/GSFC
BUILDING 16
GREENBELT ROAD
GREENBELT, MD. 20771
M/F: ADVANCED OPERATION PLANNING SECTION, CODE 861.1
4. AIRFREIGHT - BA FLT. 718 VIA SYD. ETA SYD 1900 HRS 25 DEC. TRANSFER TO GF FLT. 530 ETA SFO 2100 HRS 25 DEC. TRANSFER TO TW FLT 62 ETA BAL 0620 HRS 26 DEC.
5. 081-23718682
6. BALTIMORE, MD.
7. 4 CARTONS 200 LBS

<u>SIC NR</u>	<u>TAPE NR OR DSS NR</u>	<u>TOTAL ITEMS</u>
M1031OS	DSS-630	5
A1012OS	DSS-430	1
A1012OS	DSS-450	1
A1012OS	DSS-530B	1
A1012OS	DSS-531	1
G0016ST	DSS-430	1
A1602OS	4030807	1
A1010OS	604906148-6150	3
A1045OS	80020124	1
8. N/A		
9. LOGS SUPR		

18/2150Z DEC 71 ACRO

8.5.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
1.	Station name (three-digit TTY routing designation) and voucher number.
2.	Date of shipment.
3.	Address shipment is consigned to (M/F will be included on this line when applicable).
4.	Method of shipment, airfreight, registered/certified mail (include flight numbers, change points, airlines, and ETA [local time] each airport, as applicable).
5.	Airway bill number, registered/certified number, as applicable.
6.	Name of arrival airport for airfreight shipments. Indicate N/A for mail shipments.
7.	Indicate on first line total number of cartons being shipped, and the approximate weight of the shipment in U.S. pounds. Indicate in three separate columns the following information: <ul style="list-style-type: none">(a) Support identification code.(b) Tape sequential number(s) or DDS number(s) assigned, as applicable.(c) Total number of each specific data item(s) (e.g., magnetic tapes, stripcharts).
8.	Name of anyone hand carrying data from a station, and a list of data carried if different than listed in line 7.
9.	Name of individual at the station who is cognizant of this shipment.

Note

If the information required in lines 4 and 5 is not available at the time of transmission, a follow-up message will be sent as soon as the information becomes available, or within 24 hours.

8.6 RECORDED DATA REPORT

Detailed procedures are described in STDN No. 502.11 and appropriate NOSP's and/or mission supplements. This report is not required from stations submitting PASSUM's containing part BTAPE section.

8.6.1 PRECEDENCE

RR or NN

8.6.2 ROUTING INDICATORS

GFDA GTWL

8.6.3 CLASSIFICATION

RECORDED DATA REPORT

8.6.4 EXAMPLE

RR GTWL GFDA
DE ACRO 046A
18/2145Z
FM OPSR
TO GTWL/CODE 861.1
INFO GFDA/DSS

RECORD OF RECORDED DATA, G1032OS LOG NO. 256

DSS NO.	START/STOP	START/STOP	DISTRIBUTION
570	200/1-6	200/1-3	GSFC
630	200/1850-1859C	200/1918-1931	GSFC
	200/1950-2000	200/1948-2003	
630	200/2022-2053	200/2051-2131D	GSFC
631	200/1902-1925C	200/2105-2132	HELD
631	200/1854-1903D		GSFC
670	200/201/1-4		GSFC

08/2150Z MAR 71 ACRO

8.6.5 TEXT EXPLANATION

For LOG NO., enter a sequential number which is a three-digit figure (e.g., 001 for the first message) sent for first day or week of the year, and continue to the end of the year.

8.7 GSFC-ORIGINATED TELEMETRY CRF

This message will be transmitted if actual spacecraft telemetry frequencies differ more than the allowed tolerance.

8.7.1 PRECEDENCE

NN

8.7.2 ROUTING INDICATORS

All supporting stations

8.7.3 CLASSIFICATION

CRF

8.7.4 EXAMPLE

NN (All supporting stations)
DE GCEN 013
10/1010Z
FM NOM
TO ALL/OPSR

CRF G1034OS
TELEMETRY

1. LINK
2. FREQUENCY MHZ
3. DEVIATIONKHZ/RADIANS/PERCENT
4. NOTES AND/OR ANOMALY

10/1012Z JUL 71 GCEN

8.7.5 TEXT EXPLANATION

Text is self-explanatory.

8.8 STATION ORIGINATED TELEMETRY CRF MESSAGE

This message will be transmitted if actual spacecraft telemetry frequencies differ more than the allowed tolerances and have not previously been reported.

8.8.1 PRECEDENCE

NN

8.8.2 ROUTING INDICATORS

DSDB, HNET

8.8.3 CLASSIFICATION

CRF

8.8.4 EXAMPLE

NN DSDB HNET
DE GUPA/AOCC 046
20/2020Z
FM ACON
TO ALL/OPSR

CRF M1060LS
VHF TELEMETRY
1. LINK
2. FREQUENCY MHZ
3. DEVIATION KHZ
4. Notes and/or Anomaly

20/2022Z AUG 71 GUPA/AOCC

8.8.5 TEXT EXPLANATION

Text is self-explanatory.

8.9 INTERANGE VECTOR MESSAGE (IRV)

8.9.1 PRECEDENCE

SS

8.9.2 ROUTING INDICATORS

GDRO and station indicator

8.9.3 CLASSIFICATION

AQ

8.9.4 EXAMPLE

SS GDRO MVAN
DE GCQU
23/2336Z

INTELSAT DELTHI
IRSTVAN
200000 07 23 0000 2
&0014791228 34 -0015151687 35 &0007236782 35
&1657108 28 &1175963 37 -0783614 30 2335240 19
IRED

23/2336Z JUL 71 GCQU

8.9.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
1	Routing indicators.
2	Originating station.
3	Date time group.
4	If included, will contain message type information.
5	Start code and three-letter station designator.
6	Data test number, month, day, orbit number, and body number.
7	Position component, X, /feet; Checksum X; Position component, Y, /feet; Checksum Y; Position component, Z, /feet; Checksum Z.
8	Velocity component, X, feet/second; Checksum; Velocity component, Y, feet/second; Checksum; Velocity component, Z, feet/second; Checksum;
	Epoch time (GMT) hours, minutes, seconds, and tenths of seconds.
9	End Code.
10	Time of preparation.

Note

Checksum is derived by computing the arithmetic sum of the numeric characters in the preceding group. When a minus sign appears within the group, add 1 for the checksum.

8.10 MCC-GENERATED INTERRANGE VECTOR MESSAGE

8.10.1 PRECEDENCE

SS

8.10.2 ROUTING INDICATORS

GDRO, HNET and Station Indicator

8.10.3 CLASSIFICATION

AQ

8.10.4 EXAMPLE

SS MVAN GDRO HNET
DE HRTC 043
18/0526Z

IRSTSWAPS

200000 06 18 0045 1

-0008133762 31 &0010097303 23 - 0020350195 26

-1658482 34 &1149874 34 &1276336 28 0526400 17

IREDD

18/0527Z JUN 71 HRTC

8.10.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
-------------	--------------------

1	Routing Indicators - Data for Apollo use is as follows:
---	---

<u>Name</u>	<u>Designation</u>	<u>Routing Indicator</u>
Vanguard	VAN	MVAN
Bermuda	BDA	GBDA
Carnarvon	CRO	ACRO
Merritt Island	MLA	GCNV
Apollo Range Instrumentation Aircraft	ARIA	GCNV

2	HRTC indicates the message originated at the Houston real-time computers. GCQU would indicate the message has originated at the Goddard computers.
---	--

3	Date Time Group
---	-----------------

4	Message header
---	----------------

5	Data test number, month, day, orbit number and body number. 1 = CSM, 2 = SIVB, 3 = LM)
---	---

6	Sign X, Cksum X Sign Y, Cksum Y Sign Z, Cksum Z.
---	--

7	Sign X, Cksum X Sign Y, Cksum Y Sign Z, Cksum Z. Time Cksum Time
---	---

8	End of message code
---	---------------------

9	Time of preparation -HRTC or GCQU
---	-----------------------------------

8.11 TEST SUPPORT INSTRUCTION (TSI)

This message is transmitted by the NOCC. Service messages are never used to change or correct a TSI.

8.11.1 PRECEDENCE

SS, NN, PP, or RR

8.11.2 ROUTING INDICATORS

a. Manned. DSDC

b. Unmanned. All supporting stations and Project.

8.11.3 CLASSIFICATION

TSI

8.11.4 EXAMPLES

a. Manned

PP DSDC
DE GCEN 013A
23/0443Z
FM/NOM
TO (Action stations)
INFO SDI-103C

TSI
TSI NR XXX M1060LS (Apollo 16)
SUBJECT: ERRATA AUTHORIZATION
ACTION: STADIR/OPSR

.....Text.....

23/0445Z AUG 71 GCEN

b. Unmanned

PP (All supporting stations and Project)
DE GCEN 006A
10/1300Z
FM NOM
TO (Action station)
INFO (As required)

TSI
TSI NR XXX
SUBJECT:
ACTION: STADIR/OPSR

.....Text.....

10/1330Z AUG 71 GCEN

Distribution - Standard 11.

8.11.5 TEXT EXPLANATION

Text is self-explanatory.

8.12 INSTRUMENTATION SUPPORT INSTRUCTION (ISI)

This message is transmitted by the NOCC. Service messages are never used to change or correct an ISI.

8.12.1 PRECEDENCE

SS, NN, PP, or RR

8.12.2 ROUTING INDICATORS

DSDC HNET

8.12.3 CLASSIFICATION

ISI

8.12.4 EXAMPLE

PP DSDC HNET
DE GCEN 044A
10/1235Z
FM NOM
TO (Action stations)
INFO SDI-103C

ISI
ISI NR XXX M10600S (Apollo 16)
SUBJECT: SPECIAL PROCEDURE
ACTION: STADIR/OPSR

.....Text.....

10/1240Z AUG 71 GCEN

8.12.5 TEXT EXPLANATION

Text is self-explanatory.

8.13 SUPPORT REQUEST (SR)

8.13.1 PRECEDENCE

RR

8.13.2 ROUTING INDICATORS

GCEN and other stations as applicable

8.13.3 CLASSIFICATION

SR

8.13.4 EXAMPLES

a. SR

RR GCEN
DE GGDS 017
28/2146Z
FM OPSR
TO GCEN/NOCC

SR

- I. GDS SR NO. 11-06
- II. GDS EQUIP. ALLOCATION/MG-403, TABLE 11-5
- III. N/A
- IV. REQUEST INFORMATION PERTAINING TO DATA CONV/FM MULTIPLEXER UNIT, 4900 SERIES (EMT) LOCATED IN THE TV MONITOR RACK OF THE RECORDER BLOCK, AS TO SYSTEM LISTING. RECOMMEND THAT A PROVISION BE MADE UNDER SYSTEMS 20 FOR LISTING THIS UNIT.

28/2152Z NOV 71 GGDS

b. SR Answer

RR GGDS
DE GCEN 019A
29/1656Z
FM NOCC
TO GGDS STADIR/OPSR

SR

- I. YOUR SR NR 11-06 DTG 28/2146Z
 - II. EQUIPMENT ALLOCATION/MG-403, TABLE 11-5
 - III. N/A
 - IV. WE ARE IN THE PROCESS OF UPDATING THE SYSTEMS 20 LISTING TO REFLECT THIS EQUIPMENT. WILL FORWARD ASAP
- W. JONES SENDS

29/1700Z NOV 71 GCEN

8.13.5 TEXT EXPLANATION

- I. Station, month, and SR number.
- II. Subject matter in question (each SR will only indicate one subject).
- III. Mission in question, if applicable (each SR will only indicate one mission).
- IV. Specific request/answer.

8.14 SR ACKNOWLEDGEMENT MESSAGE FORMAT

8.14.1 PRECEDENCE

RR

8.14.2 ROUTING INDICATOR

(As applicable)

8.14.3 CLASSIFICATION

SR

8.14.4 EXAMPLE

RR LCYI
DE GCEN 004
03/1500Z
FM NOCC
TO LCYI STADIR/OPSR

SR
YOUR SR 12-03, DTG 03/1400Z HAS BEEN RECEIVED AND ASSIGNED
TO CODE 811.4.
THE ANSWER IS ESTIMATED TO BE FORTHCOMING ON OR ABOUT 10
DEC 71.

03/1501Z DEC 71 GCEN

8.14.5 TEXT EXPLANATION

Text is self-explanatory.

8.15 SUPPORT REQUEST ADVISORY

This message is transmitted monthly to the STDN.

8.15.1 PRECEDENCE

RR

8.15.2 ROUTING INDICATOR

DSDN

8.15.3 CLASSIFICATION

ADVISORY

8.15.4 EXAMPLE

RR DSDN
DE GCEN 011
02/1825Z
FM NOCC
TO ALL STADIR/OPSR

ADVISORY

1. AS OF 31/2359Z OCT THE FOLLOWING SR'S REMAIN UNANSWERED/OPEN.

STA	SR-NR	DTG	SIC NR	ACTION	OPEN
ACN	08-02	04/1615Z	M1032OS	851.3	
ACN	10-03	05/1715Z	N/A	851.1	X
BDA	10-04	09/1514Z	N/A	823.2	

02/1830 NOV 71 GCEN

8.15.5 TEXT EXPLANATION

Text is self-explanatory.

8.16 REQUEST FOR INSTRUMENTATION CLARIFICATION (RIC)

8.16.1 PRECEDENCE

NN or RR

8.16.2 ROUTING INDICATORS

a. Manned. DSDB GCTR GNNS GSTS GUPA HMSC JPIR LRID

b. Unmanned

(1) ALSEP. DSDD.

(2) Other. GUNV, All supporting stations

8.16.3 CLASSIFICATION

RIC

8.16.4 EXAMPLES

a. RIC (other)

RR GUNV (All supporting stations)
DE GROS 003
20/1014Z
FM OPSR
TO GUNV/NOCC

RIC
ROS RIC NR. 1 F1104OS
SUBJECT: NR 601 SKYNET B DTD AUG, 70 SECTION 16, PARA 3
(REPORTING PROCEDURES)

.....Text.....

20/1018Z OCT 71 GROS

b. RIC Answer (other)

RR GUNV (All supporting stations)
DE GCEN 058 A
20/1530Z
FM NOM
TO GROS/OPSR

RIC
ANS ROS RIC NR 1 DTG 20/1014Z F1104OS
SUBJECT: NR 601/SKYNET B DTD AUG 70 SECTION 16, PARA 3
(REPORTING PROCEDURES)

.....Text.....

20/1532Z OCT 71 GCEN

8.16.5 TEXT EXPLANATION

Text is self-explanatory.

8.17 DOCUMENTATION CHANGE NOTICE (DCN)

DCN's are issued to correct or modify documentation originating within the Network Operations Division. Service messages are never used to change or correct a DCN.

8.17.1 PRECEDENCE

PP or RR

8.17.2 ROUTING INDICATORS

a. Operational Support Documents

(1) Manned. DSDC

(2) Unmanned

(a) ALSEP. DSDD HANC

(b) Other. All supporting stations, and/or distribution in NOSP's

b. Other Documents. As appropriate

8.17.3 CLASSIFICATION

DCN

8.17.4 EXAMPLES

a. Operational Support Documents

RR DSDC
DE GCEN 014
25/1843Z
FM NOCC
TO (Action stations)
INFO SDI-103C

DCN
NR 601/H1052NA (INTELSAT IV F-3) DATED OCT 71 DCN NR. 001
SUBJECT: CHANGE TO SECTION 16, (REPORTING PROCEDURES)
ACTION/OPSR

.....Text.....

25/1845Z NOV 71 GCEN

b. Other Documents

RR (As appropriate)
DE GCEN 016A
12/1753Z
FM NOCC
TO (Action stations)

DCN
SST 417F-00 DATED 15 FEB 70 DCN NR. 002
SUBJECT: CHANGE TO SST 417F-00
ACTION: OPSR
PAGE 6, PARA 7.1.4. DELETE PARA IN ITS ENTIRETY AND REPLACE
WITH THE FOLLOWING:

7.1.4 PEAK-TO-PEAK VOLTAGE OF THE DISPLAYED COMPOSITE

WAVEFORM SHOULD MEASURE 7V P-P.

POINT OF CONTACT: M. BOWES

12/1755Z MAY 71 GCEN

8.17.5 TEXT EXPLANATION

Text is self-explanatory.

8.18 DOCUMENTATION ADVISORY MESSAGE

This message is transmitted in accordance with mission requirements.

8.18.1 PRECEDENCE

NN or RR

8.18.2 ROUTING INDICATORS

a. Manned. DSDB GUPA

b. Unmanned

(1) ALSEP. DSDD HANC

(2) Other. Applicable supporting stations

8.18.3 CLASSIFICATION

ADVISORY

8.18.4 EXAMPLE

NN DSDB GUPA
DE GCEN 022
01/0210Z

ADVISORY A1060LS (APOLLO 16)
ADVISORY NR 017 AS OF 31/2359Z
A. ISI NR 001 DTG 21/0001Z IS CURRENT.
B. NUMBER OF ISI'S TRANSMITTED: 74
C. SUBJECT OF ISI'S IN PREPARATION: NONE
D. RIC'S ANSWERED BY ISI'S IN PREPARATION: NONE
E. RIC STATUS

STA	NR. RCVD	UNANSWERED NUMBERS	OPEN NRS
ACN	15	0	0
ARIA	1	0	0
BDA	16	0	0
CRO	14	14	0
CYI	24	0	23
ETC	5	0	0
GDS	18	0	0
GWM	29	0	0
HAW	30	0	0
HSK	47	0	0
MAD	35	35	0
MIL	12	0	0
TEX	12	0	0
VAN	10	0	4

01/0212Z FEB 71 GCEN

8.18.5 TEXT EXPLANATION

- A. TSI or ISI NR. 1 DTG.../....Z is current .
B. Number of TSI's or ISI's transmitted .
Number of DCN's to supplements/NOSP's transmitted.
Total ~~number~~ of DCN's to documents listed on DBR transmitted.

- C. Subject of TSI's or ISI's in preparation .
Subject of DCN's to supplements/NOSP's in preparation.
Subject of DCN's to documents listed in the DBR.
- D. RIC's answered by TSI's or ISI's in preparation.
RIC's answered by DCN's in preparation.
- E. RIC status .

8.19 DOCUMENTATION CHANGE NOTICE (DCN) MONTHLY SUMMARY REPORT

A summary of DCN's will be transmitted monthly from the NOCC.

8.19.1 PRECEDENCE

RR

8.19.2 ROUTING INDICATOR

DSDN, DSSW

8.19.3 CLASSIFICATION

DCN SUM

8.19.4 EXAMPLE

RR DSDN DSSW
DE GCEN 013
03/1640Z
FM NOCC
TO ALL STADIR/OPSR
INFO/DSSW ALL SWITCH CTRS

DCN SUM

1. TITLE	ISSUED DATE	DCN NR	APPLICABLE STATIONS
2. NOSP TITAN 3C	AUG 71	007	BDA, CRO, HAW
3. 02/1720Z	JUL 71		

03/1645Z AUG 71 GCEN

8.19.5 TEXT EXPLANATION

Text is self-explanatory

8.20 DOCUMENTATION REVIEW MESSAGE

8.20.1 PRECEDENCE

PP or RR

8.20.2 ROUTING INDICATORS

DSSW plus all supporting stations

8.20.3 CLASSIFICATION

DOCUMENTATION REVIEW

8.20.4 EXAMPLE

RR ACRO AORR DSSW GAGO GBUR GQUI GROS GSRM GYRS GULA LTAN LWNK
DE GCEN 012
15/1628Z
FM NOCC
TO ALL STADIR/OPSR
INFO ALL/SWITCHING CENTERS
GSRM/AFSCF OL-9 MAHE ISLAND SEYCHELLES

SUBJECT: DOCUMENTATION REVIEW FOR SUPPORT OF A1085NA, (RAE -B)

THE MISSION-UNIQUE DOCUMENTATION LISTED BELOW IS REQUIRED TO BE ON SITE AS INDICATED FOR SUPPORT OF THE MISSION. BASIC OR STANDARD PROCEDURAL AND OPERATIONS DOCUMENTS WILL STILL APPLY. QUESTIONS CONCERNING THE FOLLOWING ITEMS SHOULD REFER TO THE ITEM NUMBER AND BE ADDRESSED TO GCEN/NOCC.

DOCUMENTATION AND SHIPPING DATE	APPLICABLE STATIONS
1. NO. 601/....NOSP DATED SEPT 71 (MAILED 27 SEP 71)	AGO BUR CRO ORR QUI ROS TAN ULA WNK YRS SEYCHL
2. SSSP DATED APR 71 (MAILED 27 APR 71)	AGO BUR ORR QUI ROS TAN ULA WNK YRS
3.SIMULATION TAPE AND LOG NO. 103001, 103002, 103005, 013007 AND 103008 (PCM DATA AT 136.83 MHZ AND VARIOUS COMMANDS) (MAILED 30 APR 71)	AGO BUR ORR QUI ROS TAN ULA WNK YRS
4.COMMAND TAPE NO. SCP-FLGT- GEN 501-01. (MAILED 30 APR 71)	BUR ORR QUI ROS
5.SIMULATION TAPE NO. 103008 (PCM DATA AT 136.83 MHZ) (MAILED 26 JUL 71)	CRO SEYCHL
6.PROGRAM NO. FOO251 SIMULATOR (MAILED 15 MAR 71)	AGO BUR ORR QUI ULA
7.PROGRAM LISTING NO. FOO251 SIMULATOR (MAILED 15 MAR 71)	AGO BUR ORR QUI ULA

- | | |
|---|---|
| 8. DYNATRONICS DECOM NO.
FOO252
(MAILED 15 MAR 71) | ORR |
| 9. PROGRAM LISTING NO. 00252
(MAILED 15 MAR 71) | ORR |
| 10. ... RADIATION SIMULATOR NO.
FOO253
(MAILED 02 MAR 71) | ORR ROS TAN WNK YRS |
| 11. ... PROGRAM LISTING NO. FOO253
(MAILED 02 MAR 71) | ORR ROS TAN WNK YRS |
| 12. ... RADIATION DECOM NO. FOO254 | ORR QUI |
| 13. ... PROGRAM LISTING NO. FOO254
(MAILED 02 MAR 71) | ORR QUI |
| 14. NO. 401.1/...SRT
(MAILED 19 AUG 71) | AGO BUR CRO ORR QUI ROS TAN
ULA WNK YRS SEYCHL |

15/1634Z OCT 71 GCEN

8.20.5 TEXT EXPLANATION

Text is self-explanatory.

8.21 DOCUMENTATION CONFIRMATION MESSAGE

8.21.1 PRECEDENCE

RR or NN

8.21.2 ROUTING INDICATORS

GCEN

8.21.3 CLASSIFICATION

DOCUMENTATION STATUS

8.21.4 EXAMPLES

a. Missing Items Only

RR GCEN
DE AHSK 001A
22/2100Z
FM OPSR
TO GCEN/NOCC

DOCUMENTATION STATUS G1041OS (MARINER I)
THE FOLLOWING ITEMS ARE MISSING:

<u>DBR ITEM NR.</u>	<u>TITLE</u>	<u>REMARKS</u>
1. SCAN (003)	2-317(R) P/T	MUTILATED TAPE
2. 401.1 (005)	APOLLO SRT	NOT RECEIVED ON-STATION
3. 502.2 (007)	TLM PROCEDURES	NOT RECEIVED ON-STATION

22/2105Z AUG 71 AHSK

b. Items Received Only

RR GCEN
DE AHSK 051A
24/1745Z
FM OPSR
TO GCEN/NOCC

DOCUMENTATION STATUS G1041OS
HSK VERIFIES RECEIPT OF THE FOLLOWING:

<u>DBR ITEM NR.</u>	<u>DATE OF RECEIPT</u>
1. 502.11 (009)	JULY 31, 1971

24/1759Z AUG 71 AHSK

8.21.5 TEXT EXPLANATION

Text is self-explanatory.

8.22 OPERATIONS MESSAGE (OPN)

8.22.1 PRECEDENCE

NN or RR

8.22.2 ROUTING INDICATORS

- a. Manned. GCTR (as applicable)
- b. Unmanned. GUNV (as applicable) and Project
- c. Nonmission. GCEN.

8.22.3 CLASSIFICATION

OPN

8.22.4 EXAMPLE

RR GCTR
DE GQUI 012
17/2030Z
FM OPSR
TO GCTR/NOM
INFO (AS APPLICABLE)

OPN SIC

SUBJECT.....
..... TEXT.....

17/2040Z DEC 71 GQUI

8.22.5 TEXT EXPLANATION

Text is self-explanatory.

8.23 PROBLEM REPORT

8.23.1 PRECEDENCE

RR

8.23.2 ROUTING INDICATORS

GCEN

8.23.3 CLASSIFICATION

PROBLEM REPORT

8.23.4 EXAMPLE

RR GCEN
DE LWNK 007
21/1900Z
FM OPSR
TO GCEN/NOCC

PROBLEM REPORT

..... TEXT.....

21/1902Z AUG 71 LWNK

8.23.5 TEXT EXPLANATION

Text is self-explanatory.

8.24 RFI REPORT

8.24.1 PRECEDENCE

PP or RR

8.24.2 ROUTING INDICATORS

- a. Manned. GCTR, GSTS
- b. Unmanned. GSTS, GUNV
- c. Nonmission. GCEN, GSTS

8.24.3 CLASSIFICATION

RFI

8.24.4 EXAMPLE

RR GCEN GSTS
DE GYRS 004
30/1908Z
TO GSTS/FREQUENCY MANAGER CODE 509
INFO GCEN/NOCC

RFI G10290S INTERFEROMETER
A. AF 86970-USAF AIRCRAFT
B. 136.25 MHZ
C. A3
D. 136.249-136.251 MHZ
E. X
F. INTER-AIRCRAFT VOICE COMMUNICATIONS
G. GYRS-INTERFEROMETER
H. 136.2-136.4 MHZ
I. 136.25 MHZ
J. A-3
K. 136.249-136.251 MHZ
L. X
M. FORT MYERS FLA.
N. 30/2220Z to 30/2315Z
O. AIRCRAFT OPERATING ON UNAUTHORIZED FREQUENCY
P. ADVISE FCC AND USAF

30/1914Z SEP 71 GYRS

8.24.5 TEXT EXPLANATION

Particulars concerning the station causing the interference:

<u>Line</u>	<u>Explanation</u>
A.	Name or identification and category of station.
B.	Frequency measured.
C.	Class of emission.
D.	Bandwidth.
E.	Field strength.
F.	Nature of interference.

Particulars concerning the transmitting station interfered with:

<u>Line</u>	<u>Explanation</u>
G.	Name or identification and category of station.
H.	Frequency assigned.
I.	Frequency measured.
J.	Class of emission.
K.	Bandwidth.
L.	Field strength.

Particulars furnished by the receiving station experiencing the interference:

<u>Line</u>	<u>Explanation</u>
M.	Name and location of station.
O.	Date and times of occurrence of harmful interference.
P.	Other particulars.
Q.	Requested action.

Note

1. Place an X after any letter in the text if no information on this particular item is reported.
2. All harmful interference is still to be reported on applicable operational reports.

8.25 STATION POSTMISSION REPORT (MMR)

8.25.1 PRECEDENCE

RR

8.25.2 ROUTING INDICATORS

- a. Manned. GCTR, GSTS, DSDB
- b. Unmanned. GUNV, GSTS, and supporting NTKW stations.

8.25.3 CLASSIFICATION

MMR

8.25.4 EXAMPLE

RR GCTR GSTS DSDB
DE PHAW 048
18/0505Z
FM OPSR
TO GCTR/NOCC
INFO GSTS/COMM MTR

MMR M10600S

1. GENERAL (Include any problems of a general nature regarding the mission or the conduct thereof).
2. PROCEDURES (Include both station procedures and specific comments on the problems encountered during the mission).
3. DOCUMENTATION (Include any problems with mission documentation).
4. COMMUNICATIONS (Include any communications problems encountered).
5. EQUIPMENT (Include any equipment problems occurring on station. Indicate DTG of associated ESR's).

18/0510Z JAN 71 PHAW

8.25.5 TEXT EXPLANATION

Text is self-explanatory.

8.26 ADVERSE WEATHER REPORT

8.26.1 PRECEDENCE

PP

8.26.2 ROUTING INDICATOR

GCEN

8.26.3 CLASSIFICATION

ADVERSE WEATHER REPORT

8.26.4 EXAMPLE

PP GCEN
DE GACN 002
04/0900Z
FM OPSR
TO GCEN/NOCC

ADVERSE WEATHER REPORT

1. HIGH WINDS, HEAVY RAIN SQUALLS BEGAN AT 04/0845Z PREDICTED UNTIL 04/1400Z
2. USB ANTENNA STOWED, UNABLE TO SUPPORT ANY TRACKING ACTIVITIES
3. 70-80 KNOTS
4. PREDICTED 3 TO 4 INCHES OF RAIN NEXT 4 HOURS
5. N/A

04/0902Z FEB 71 GACN

8.26.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
1.	General report on the current or predicted adverse weather conditions.
2.	Effect on station support capabilities.
3.	Wind velocity.
4.	Rainfall.
5.	Extent of flooding.

Note

If item is unknown or cannot be determined, type "UNK"; if item is not applicable, type "N/A."

8.27 STATION GENERAL OPERATIONS SCHEDULE

8.27.1 PRECEDENCE

NN or RR

8.27.2 ROUTING INDICATORS

Applicable stations

8.27.3 CLASSIFICATION

GENERAL SUPPORT SCHEDULE

8.27.4 EXAMPLE

RR GAGO
DE GCEN
24/2240Z
FM NOCC
TO GAGO STADIR OPSR

AGO 710927 GENERAL SUPPORT SCHEDULE
SUPIDEN STRT STOP IFCD RTCONF REMARKS

S0017PM 0110 0410 XXXX DX486D HYDRAULICS PM(Event Line)

A10190S 0127 0137 EBAB BB821E CMD PBM REQ(Event Line)
0117 0137 1V-NOCC/MSOCC,IVD-MSOCC(Comm Line)

A10290S 1245 1305 BXXA CX866B PFM ONLY

AGO 710928 GENERAL SUPPORT SCHEDULE(New Day)
SUPIDEN STRT STOP IFCD RTCONF REMARKS

A10410S 0122 0129 EBBC BB866A CMD SEQ 11 AT 012341(Event Line)
0112 0134 1V-NOCC/MSOCC.....(Comm Line)
0112 0129 1VD-MSOCC(Comm Line)

24/2251Z SEP 71 GCEN

8.27.5 TEXT EXPLANATION

Event Line

Column

SUPIDEN
STRT
STOP

IFCD
RTCONF
REMARKS

Explanation

Support identification code.
Time of support start, pass start, or data start.
Time of support termination, pass termination,
or data termination.
Interface code.
Configuration code.
Supplemental information.

Communications Line

Column

Explanation

STRT

Time of start for the communications.

STOP

Time of stop for the communications.

REMARKS

Type of lines and participants.

8.28 NETWORK OPERATIONS SCHEDULE UPDATE

8.28.1 PRECEDENCE

RR or NN

8.28.2 ROUTING INDICATORS

GUNV, applicable stations, applicable center, and Project.

8.28.3 CLASSIFICATION

OPERATIONS SCHEDULE UPDATE

8.28.4 EXAMPLE

RR GAGO GUNV GSTS GNBS
DE GCEN 008C
19/1800Z
FM NOCC
TO STADIR/OPSR

AGO GENERAL SUPPORT SCHEDULE
SUPIDEN STRT STOP IFCD RTCONF REMARKS

DELETE 710927
A10410S 0406 0416 BAAB AX4012
0356 0416 1V-NOCC/MSOCC
A10290S 1245 1305 BXXA CX866B PFM ONLY

ADD 710927
A10410S 0415 0435 BAAB AX4012
0420 0435 1V-NOCC/MSOCC

19/1800Z SEP 71 GCEN

8.28.5 TEXT EXPLANATION

Column

SUPIDEN
STRT
STOP
IFCD
RTCONF
REMARKS

Explanation

Support identification code.
Time of pass start, data start, support start.
Time of pass, data, or support termination.
Interface code.
Configuration code.
Supplemental information.

8.29 STATION SCHEDULE REQUEST

8.29.1 PRECEDENCE

RR

8.29.2 ROUTING INDICATOR

GCEN

8.29.3 CLASSIFICATION

SCHEDULE REQUEST

8.29.4 EXAMPLE

RR GCEN
DE GBDA 002
14/1420Z
FM OPSR
TO GCEN/NOCC

STATION SCHEDULE REQUEST

1. S1010NA
2. 27/0800-1200Z
3. BDA
4. 136 ANT. 642B-2, RCVS
5. NONE
6. OPERATOR TRAINING

14/1421Z SEP 71 GBDA

8.29.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
1.	Support identification code or short title of activity.
2.	Start stop, T-zero, or pass time.
3.	Station.
4.	Equipment affected.
5.	Operations affected.
6.	Test description/reference document remarks.

8.30 NON-PARTICIPATION REQUEST

8.30.1 PRECEDENCE

RR

8.30.2 ROUTING INDICATOR

GCEN

8.30.3 CLASSIFICATION

NON-PARTICIPATION REQUEST

8.30.4 EXAMPLE

RR GCEN
DE AHSK 003
08/0247Z
FM OPSR
TO GCEN/NOCC

NON-PARTICIPATION REQUEST

1. M1032OS
2. 18/1139Z-1146Z
3. UNFORESEEN PROBLEMS IN THE INSTALLATION OF EC3469 WILL PREVENT FULL OPERATING CAPABILITY OF THE 85-FOOT ANTENNA.

08/0249Z SEP 71 AHSK

8.30.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
1.	Support identification code.
2.	Time frame involved.
3.	Explanation and remarks.

8.31 STATION MANNING STATUS

8.31.1 PURPOSE

This message notifies the NOCC that the station is manned and starting preparation for support.

8.31.2 PRECEDENCE

RR or NN

8.31.3 ROUTING INDICATORS

a. Manned. GCTR and GSPA

b. Unmanned. GUNV and GSPA

8.31.4 CLASSIFICATION

MANNING STAT

8.31.5 EXAMPLE

RR GCTR GSPA
DE ACRO 005
25/1830Z

MANNING STAT M1060LS
CRO MANNED AT 25/1830Z
STATION READINESS PREPARATION UNDERWAY.

25/1832Z AUG 71 ACRO

8.31.6 TEXT EXPLANATION

Text is self-explanatory.

8.32 EQUIPMENT STATUS REPORT (ESR)

8.32.1 PRECEDENCE

PP or RR

8.32.2 ROUTING INDICATORS

GCEN HFOS GFDA GNBS GNST GVVV

8.32.3 CLASSIFICATION

ESR

8.32.4 EXAMPLE

RR GCEN HFOS GFDA GNBS GNST GVVV GUPA
DE GUPA 004
01/1555Z
TO GNBS GNST GUPA DOOT DDMS
INFO GCEN/HGLASS/EDS/CODE 852/OSG
GFDA/D BENNETT CODE 821.2

SUBJ: EQUIPMENT STATUS REPORT

REF: NEW JAN 72
TRNR: ARIA 1
SYS: B
SER: VHF TRANSMITTER
TYPE: RED
NO GO: 72004/1500
ETRO: 72004/2200
REMARKS: RF CHOKE OPEN IN FINAL AMP

01/1558Z MAR 72 GUPA

8.32.5 TEXT EXPLANATION

REF	For an initial report, enter the word new, followed by current month and year. For update reports, the date-time group, month and year of the initial report must be entered here.
TRNR	The ARIA number (1-4) or AOCC will be required on all reports.
SYS	The applicability letter in the equipment list.
SER	The name of the equipment.
TYPE	The code word indicating the status of the equipment.
NO GO	The time the outage began. This is a nine-digit number with a slash between the fifth and sixth digits. The first two digits are the last two digits of the year. The next three digits represent the Julian day followed by a slash. The last four digits are the GMT in hours and minutes.
ENTRO	In an initial report enter the estimated time of return to operation, use the nine digit format as for NO GO entry. If ETRO cannot be determined, enter: Unknown. When an ETRO depends upon the arrival of parts plus time, enter a period of time not to exceed ten characters. Update reports do not require an entry for this heading unless an ETRO is being changed.
GO	The time the equipment is returned to the documented operational configuration. Use the same nine-digit format as for a NO GO or an ETRO entry. It is possible for the GO time and the NO GO time to be the same, but this is only true when an initial report is being cancelled. If an initial report is cancelled, enter the word " <u>cancel</u> " in the remarks portion of the message followed by the reason the cancellation is requested.
REQN	Enter requisition number if parts have been ordered through NASA Logistics. If more than one requisition number is required enter the prime requisition number followed by a 1 in parentheses. Enter all other requisition numbers with their sequence numbers in the remarks field. The first requisition number in the remarks field has sequence number (2).
REMARKS	In an initial report, enter a description of the downtime or failure, including the action being taken and any problems encountered.

When equipment is reported inoperative due to component limitations, enter the limitations in quantitative terms. When equipment is down for P. M., enter, as the first statement, the step number and reference documentation of the procedure being used. In all initial reports, enter the operations to be affected by the equipment downtime. Pass information is not required in update reports unless the ETRO is extended. If an ETRO is extended, include any additional passes and operations affected.

In update reports, if the remarks are to be changed, include the complete history of the outage except for previously reported pass and operations information. If the equipment is down for an extended period of time, the remarks may be edited or consolidated as long as no information indicating the history of the problem is deleted.

8.33 COUNTDOWN STATUS

8.33.1 PRECEDENCE

NN or RR

8.33.2 ROUTING INDICATORS

All supporting stations

8.33.3 CLASSIFICATION

STAT

8.33.4 EXAMPLE

NN (All supporting stations) GUNV
DE GCEN 004
04/1154Z

COUNT STAT M1060LS
AT 04/11:50:00Z THE COUNT IS T-00:10:00 AND COUNTING

04/1156Z APR 71 GCEN

8.33.5 TEXT EXPLANATION

Text is self-explanatory.

8.34 LIFTOFF MESSAGE

The NOM or the Manned Project will transmit this message for all missions immediately after liftoff to notify the stations of liftoff time, launch azimuth, and start of GET.

8.34.1 PRECEDENCE

SS

8.34.2 ROUTING INDICATORS

- a. Manned. DSDC GCTR
- b. Unmanned. All supporting stations and GUNV

8.34.3 CLASSIFICATION

SPE

8.34.4 EXAMPLE (UNMANNED)

SS (All Supporting Stations) GUNV
DE GCEN 031
23/2317Z

SPE M1060LS

LIFTOFF23:17:00Z/23:17:00Z

LAUNCH/AZIMUTH 72.00

START OF GET 23:17:00Z/23:17:00Z

23/2319Z FEB 71 GCEN

8.34.5 TEXT EXPLANATION

Text is self-explanatory.

8.35 TLI ADVISORY MESSAGE

Following TLI cutoff, the NC will transmit a TLI Advisory Message.

8.35.1 PRECEDENCE

SS

8.35.2 ROUTING INDICATORS

DSDC, GCTR, HNET, HALO, and HFOS

8.35.3 CLASSIFICATION

SPE

8.35.4 EXAMPLE

SS DSDC GCTR HNET HALO HFOS
DE HMSC 072
21/1550Z

SPE NCG-741

1. TLI IGNITION XXX:XX: (HRS:MIN) GET.
2. TLI CUTOFF XXX:XX: (HRS:MIN) GET.
3. TLI BURN WAS NOMINAL.
4. CHANGE CSM AND LM MAP WAITING PERIOD TO 2.8 SECONDS
AND SLV MAP WAITING PERIOD TO 1000 MILLISECONDS AT
(HRS:MIN) GET.
5. CHANGE RETRANSMIT SETTING TO ZERO AT (HRS:MIN) GET.
6. 85-FOOT ANTENNA STATIONS USE 10KW OUTPUT AT (HRS:MIN)
GET.
7. USE POST-TLI SCM'S AND ACQUISITION MESSAGES.

21/1553Z JUN 71 HMSC

8.35.5 TEXT EXPLANATION

1. TLI ignition (GET).
2. TLI cutoff (GET).
3. A general statement of TLI success or failure.
4. GET when stations will change SLV MAP waiting period to 1000 milliseconds and CSM and LM MAP waiting periods to 2.8 seconds (nominally TLI cutoff plus 50 minutes).
5. GET when stations will change CSM, LM, and SLV retransmit settings to zero (nominally TLI cutoff plus 10 hours).

6. GET when 85-foot antenna stations will radiate 10 kW (nominally TLI cutoff plus 3 hours).
7. A statement of which SCM's and acquisition messages to use.

8.36 APOLLO MANEUVER INFORMATION MESSAGE

8.36.1 GENERAL

This message is transmitted to GDRO, GUPA, GDCS, and GCNV for Apollo maneuvers and is used to update the GRTS and AOCC IS computers with orbital data changes.

8.36.2 EXAMPLE

a. Message

HEADER	<<≡ ↓	
	***↑\$\$\$↓*↓↓↓↓<<≡ ↓	
	Δ*<<≡ ↓	Header Provided by CP
	Δ*Δ↑\$\$\$<<≡↑	
	\$\$/\$\$\$ ↓ Z<< ↓	
TEXT	1 APOLLOΔMANEUVERΔINFORMATION<<≡ ↓	
	2 ^-VEH. ID	
	**↑Δ\$\$\$\$\$.<<≡↑	
	HR MN SEC WEIGHT	
	3 \$\$\$Δ\$\$\$\$.Δ\$\$\$\$\$.<<≡↑	
	4 SXX.XXXXXXXXΔSY.YYYYYYYYΔSZ.ZZZZZZZZ<<≡↑	
	5 ΔSX.XXXXXXXXΔSY.YYYYYYYYΔSZ.ZZZZZZZZ<<≡↑	
	HR MIN SEC WEIGHT	
6 \$\$\$Δ\$\$\$\$.Δ\$\$\$\$\$.<<≡↑		
7 SXX.XXXXXXXXΔSY.YYYYYYYYΔSZ.ZZZZZZZZ<<≡↑		
8 ΔSX.XXXXXXXXΔSY.YYYYYYYYΔSZ.ZZZZZZZZ		
	<<≡↑	
EOM	\$\$/\$\$\$↓ZΔ***Δ***	Ending Provided by CP
	<<=====	
		↑# ↓↓↓↓↓↓↓↓↓↓↓

8.36.3 TEXT EXPLANATION

1. Message title
2. Vehicle ID (CM = Command Module, LM = Lunar Module, and SB = Saturn-IVB) and the duration of the burn in seconds with the decimal point as shown.
3. GMT of Propulsion Initiation (GMTPI) and the weight of GMTPI in pounds.
4. & 5. Position components (X, Y, Z in Earth Radii) and the velocity components (\dot{X} , \dot{Y} , \dot{Z} in Earth Radii/Hour) of the vector at GMTPI.
6. GMT of cutoff (GMTCO) and the weight at GMTCO in pounds.
7. & 8. Position components (X, Y, Z in Earth Radii) and the velocity components (\dot{X} , \dot{Y} , \dot{Z} in Earth Radii/Hour) of the vector at GMTCO.

Note

1. The vectors at GMTPI and GMTCO are in the Greenwich Midnight Prior to Launch (GMPL) coordinate system with the positive X-axis in the true equatorial plane directed from geocenter through Greenwich longitude, the positive Z-axis from geocenter toward the true North Pole, and the positive Y-axis completing the right hand system.
2. Sign Convention: $\Delta(\text{space})$ = plus; - = minus.

8.37 RADIATION CLEARANCE REQUEST

8.37.1 PRECEDENCE

NN or RR

8.37.2 ROUTING INDICATORS

a. Manned Premission and Mission Periods. GCTR

b. Unmanned. GUNV

8.37.3 CLASSIFICATION

RADIATION REQUEST

8.37.4 EXAMPLE

NN GUNV
DE GBUR 005
03/1744Z

RADIATION REQUEST
1. 03/2100Z-03/2230Z
2. ANTENNA TEST
3. SATAN
4. 148.980MHZ-AM
5. 3KW
6. N/A
7. X-45 Y-45
8. N/A

03/1748Z SEP 71 GBUR

8.37.5 TEXT EXPLANATION

<u>Line</u>	<u>Explanation</u>
1.	Start-Stop time of radiation.
2.	Explanation for radiation.
3.	Command system to be used.
4.	Frequency/type of modulation.
5.	Maximum power output.
6.	Commands to be transmitted.
7.	Azimuth and elevation of antenna.
8.	Present position (VAN and ARIA only).

Note

AOCC will notify the NC of the clearance obtained from the ETR.

8.38 EARTH ORBITAL SITE CONFIGURATION MESSAGE (SCM)

8.38.1 GENERAL

The SCM will be generated by the CCATS instrumentation tracking controller (Track) and transmitted to arrive at a specific station no later than H-30 minutes. A new message will be generated for each station pass. Information in the SCM will be pertinent to the revolution number specified, and will contain the following configuration information for the upcoming pass:

- a. Vehicle to be tracked.
- b. USB modes (uplink, PM downlink, FM downlink).
- c. Radar tracking requirements.
- d. Telemetry onstation biomed patching.
- e. A-G voice requirements.
- f. Handover/carrier on/off times.
- g. Other specific MCC requirements.

8.38.2 PRECEDENCE

SS.

8.38.3 ROUTING INDICATORS

Applicable station, GCTR, DSSW, HDYN, HNET, HSPO, and HOSC for station SCM's supporting the IU/CCS.

8.38.4 CLASSIFICATION

SCM.

8.38.5 EXAMPLE

```
SS GUPA GCTR GSTS HDYN HNET HSPO
DE HMSC 006
16/1305Z
SCM ARIA-1 2/2
A. USB
CSM 2.01.02 ON: 02:44:00 OFF: 02:50:00
B. TLM
N/A
C. A-G
CSM SA REMOTE: SAME
D. C-BAND N/A
16/1306Z JUN 71 HMSC
```

8.38.6 TEXT EXPLANATION

a. General

(1) The first line of the SCM will contain the message classification (SCM) followed by the 3-letter station designator. Following the station designator will be the revolution number to which the message applies. All times given in the SCM will be GET. The SCM will be divided into five separate sections as follows:

- (a) USB (Section A).
- (b) Telemetry (Section B).
- (c) A-G (Section C).
- (d) C-band (Section D).
- (e) Note (Section E).

(2) Any section which does not apply to a specific station or is not required to satisfy mission requirements will contain N/A.

b. USB

(1) USB configuration information will be given in seven columns.

(2) The first column will indicate the system to which all information on that horizontal line applies. Various systems may be required depending on the type of station. For example, for single stations, only system 1 applies; for dual stations systems 1 and 2 apply; stations with 85-foot antennas, systems 1 and 2 apply to the prime station and systems 3 and 4 are for the wing station. In cases where systems 2, 3, or 4 are available and configuration is not specified in the SCM, these systems may be configured in accordance with the mission supplements or at station discretion.

(3) The second column will indicate the vehicle to be tracked by the system indicated in column 1.

Note

When support of a second vehicle downlink is required from a single station, that support will be assigned by indicating system 2 on the SCM.

(4) The third column assigns the USB modes and is divided into three parts. The first digit is the uplink mode, the next two digits are the PM downlink mode, and the last two digits are the FM downlink mode. The FM mode for DSE dump is included on the SCM to notify the station of an MCC requirement to support the dump during that support period. The USB system to be used for receiving the dump is left to the discretion of the station M&C.

(5) Columns 4 and 5 indicate the type (high and/or low speed) or trajectory data required. If column 4 contains the letter H, high-speed trajectory data is required. An L in column 5 indicates that low-speed trajectory data is required.

(6) Columns 6 and 7 indicate carrier on/off times. These times will be given and will apply whether or not a handover occurs. If the word "PASSIVE" appears, in lieu of carrier on/off times, the system has been scheduled and the carrier will be brought up only if directed by RTC. The word "SAME" in any time block (USB systems 2, 3, or 4 or A-G) means that the on/off or remote local time is the same as for USB system 1. The A-G voice will go remote or local to coincide with carrier on or off times.

EXAMPLE

A. USB

1 CSM 6.02.02 H L ON: 01:44:00 OFF: 01:50:00

2 CSM 0.02.00 ON: PASSIVE

c. TLM. Not applicable for AS-511.

d. A-G

(1) General. The air-ground section will reflect only VHF configuration information and remote/local times which control (a) uplinking of VHF mode indicated or (b) enabling of best source (USB/VHF) downlink to MCC.

(2) Vehicles. Column 1 will indicate only the vehicle to which the VHF transmitting antenna will be pointed. Stations will ensure VHF communication is available to this vehicle. Dual VHF stations will track the opposite vehicle with their second antenna.

(3) Mode. Only the following VHF modes will be given in column 2:

SA - Simplex A

DA - Duplex A

SB - Simplex B

DB - Duplex B

(4) Remote/Local Times. Remote/local times will be given for uplinking of VHF mode to specified vehicle and enabling best source downlink (VHF/USB) to MCC.

Note

1. If the word "SAME" appears following remote, the remote/local times are respectively the same as USB "system 1" carrier on/off times.

2. If the word "PASSIVE" appears following the word remote, no remoting of VHF uplink or best source downlink is required.

EXAMPLE

C. A-G

CSM SA REMOTE 01:44:00 LOCAL 01:50:00

e. C-band

(1) This section will give C-band radar tracking requirements in four columns.

(2) The first column will contain the radar type; all other information on the horizontal line will apply to the radar system indicated. (Two systems are possible at BDA.) The following list indicates the symbols which will be used and the corresponding radar type:

<u>Symbol</u>	<u>Radar Type</u>
16	FPS-16
6	FPQ-6
18	TPQ-18

(3) The second column will indicate the vehicle to be tracked. The four possible vehicles which may be assigned are CSM, LM, IU, and S-IVB.

(4) The third column will contain the mode of track to be used. BCN will indicate beacon track and SKN will indicate skin track.

(5) Columns 4 and 5 will indicate the type of trajectory data to be sent to MCC. An H in column 4 indicates high-speed data; an L in column 5 indicates low-speed data. Unless otherwise specified in the SCM, C-band data will be postpass when line limitations exist.

EXAMPLE

D. C-BAND

6	CSM	SKN	L
16	IU	BCN	L

f. Notes. This section is included to assist in clarifying any questionable items given in the previous sections. For missions with variable launch azimuths, the launch azimuth will also appear in this section of the SCM's transmitted to all stations prior to liftoff.

8.39 GET UPDATE MESSAGE

8.39.1 PRECEDENCE

SS.

8.39.2 ROUTING INDICATORS

DSDC, GCTR, HNET, HALO, HFOS, and JNDC.

8.39.3 CLASSIFICATION

SPE.

8.39.4 EXAMPLE

SS DSDC GCTR HNET HALO HFOS JNDC
DE HMSC 072
18/2020Z

SPE ACK NCG-741
GET UPDATE

1. CHANGE GET CLOCKS TO
XXX:XX:XX GET AT XX:XX:XX GMT

2. NO CHANGE WILL BE MADE TO STATION
COMPUTER TIMES.

3. NEW SCM DATA WILL FOLLOW REFLECTING
UPDATED GET.
18/2022Z APR 72 HMSC

8.39.5 TEXT EXPLANATION

Text is self-explanatory.

8.40 ARIA REENTRY MESSAGE

8.40.1 PRECEDENCE

SS or RR.

8.40.2 ROUTING INDICATORS

- a. Permission (F-45 Days). GUPA, HNET.
- b. Mission (Reentry -24 Hours and -5 Hours). GCNV, GUPA, HNET.

8.40.3 CLASSIFICATION

OPN.

8.40.4 EXAMPLES

a. Nominal Message

SS GUPA GCNV HNET
DE HMSC 023
27/1234Z
TO ARIA COMPUTER

OPN NCG-741
ARIA REENTRY FORMAT
1. LAT08:08:00.0N
LONG165:02:00.0W
2. TIME14:16:08.13
X 10761490.0
Y 16774041.0
Z 07634860.2
XDOT-24343.74
YDOT 18872.46
ZDOT-19016.86
3. LAD.270
4. LOD.207
5. CGBIAS-2.85
6. PHI21:05:16.7N
LAMBDA176:28:29.6E
7. C10X 000.0
8. CMWT 12181.
9. TIME 00:00:00.00 DATE 12:21:69
12. KSWCH
20. AERODYNAMICS TABLE

MACH	ALPHA	CL	CD
00.20	170.78	0.23680	0.82467
00.40	167.28	0.24172	0.85351
00.70	164.48	0.26218	0.98602
00.90	161.77	0.31969	1.06584
01.10	154.95	0.49251	1.17070
01.20	155.19	0.47759	1.15674
01.35	154.08	0.56162	1.27959
01.65	153.24	0.54967	1.26605
02.00	153.13	0.53251	1.27199
02.40	153.62	0.50745	1.24106
03.00	154.12	0.47896	1.21643
04.00	156.13	0.44143	1.21492
10.00	156.80	0.42853	1.22467
29.50	160.09	0.38739	1.28964

27/1247Z DEC 71 HMSC

b. Backup Mode Message

SS GUPA GCNV HNET
DE HMSC 058
19/1011Z
TO ARIA COMPUTER

OPN NCG-741
ARIA REENTRY FORMAT
1. LAT29:52:50.6N
LONG096:39:40.4W
2. TIME190:43:53.34
X-08826648.6
Y 16289897.0
Z 10575683.0
XDOT-22812.10
YDOT-11937.30
ZDOT-02252.10
3. LAD.250
4. LOD.225
5. CGBIAS-3.46
6. PHI29:52:50.6N
LAMBDA096:39:40.4W
7. C10X 000.0
8. CMWT 12333.
9. TIME 1251:00.93 DATE 12:21:69
10. GC0.20
12. KSWCH2
13. K1 055.0
14. K2 123.4
15. DOX12.34
16. LADB.250
17. RLDIR-1
18. LAT22:19:05.6N
19. LONGT 063:00:00.0W
20. AERODYNAMICS TABLE

MACH	ALPHA	CL	CD
00.20	170.78	0.23680	0.82467
00.40	167.28	0.24172	0.85351
00.70	164.48	0.25218	0.98602
00.90	161.77	0.31969	1.06584
01.10	154.95	0.49251	1.17070
01.20	155.19	0.47759	1.15674
01.35	154.88	0.56162	1.27959
01.65	153.24	0.54967	1.26605
02.00	153.13	0.53251	1.27199
02.40	153.62	0.50745	1.24106
03.00	154.12	0.47896	1.21643
04.00	156.13	0.44143	1.21492
10.00	156.80	0.42853	1.22467
29.50	160.09	0.38739	1.28964

19/0817Z OCT 71 HMSC

8.41 MANNED MISSION STATION/EQUIPMENT RELEASE

8.41.1 PRECEDENCE

NN

8.41.2 ROUTING INDICATORS

GCTR, GSPA, and affected stations

8.41.3 CLASSIFICATION

RLS

8.41.4 EXAMPLES

a. Station Release

NN ACRO GCTR GSPA
DE GCEN 048A
12/1752Z
FM NOCC
TO ACRO/OPSR

RLS

RLS CRO A10600S

1. 12/1752Z CONDITION-A
2. 13/1842Z H-70 APOLLO
3. AOS 13/1952Z REV 66 ME 19.6
13/2133Z 67 2.9

or

AOS 161:05:00 GET/13/1952Z
LOS 171:57:00 GET/14/0644Z

4. RADAR RELEASE REV 67

12/1754Z AUG 71 GCEN

b. System Release

NN GCTR GSPA (affected stations)
DE GCEN 006B
12/1730Z
FM NOCC
TO ALL/OPSR

RLS

RLS (affected stations) M1137OS

1. 12/1735Z
2. N/A
3. N/A
4. VHF TELEMETRY RELEASED FROM MISSION SUPPORT

12/1734Z AUG 71 GCEN

c. Temporary System Release

NN GBDA GCTR GSPA LCYI PHAW
DE GCEN 007B
12/1930Z
FM NOCC
TO ALL/OPSR

RLS

RLS BDA CYI HAW M1136OS

1. 12/1935Z
2. N/A
3. N/A
4. C-BAND RELEASED UNTIL EARTH INJECTION MINUS 4 HOURS

12/1934Z AUG 71 GCEN

8.41.5 TEXT EXPLANATION

1. Time station or any system is released (GMT). Station standby configuration (if applicable).
2. Time station is to begin interface testing upon return from standby condition. The H-minus count to be run and the project to be supported during the station's next period of activity.

Note

During lunar orbit, the Apollo interface time is based upon the station's moon-view period.

3. Acquisition Times

- a. Earth Orbit. Acquisition time, revolution number, and the maximum elevation angle of next required station passes.
- b. Post TLI. View period with AOS/LOS based on GET/GMT.

Note

Spacecraft or moon-view periods excluding occultations when in lunar orbit.

4. Any systems not required for a specific period (revolution, view period, mission phase, or the remainder of the mission).

8.42 POST-TRANSLUNAR INJECTION (TLI) SCM MESSAGE

8.42.1 GENERAL

- a. MCC Track will transmit the post-TLI SCM to arrive on station no later than 30 minutes before the first period of support indicated in the SCM. The SCM will contain the configuration required for the USB systems, the vehicle to be tracked, the systems modes, the TTY requirement, biomed parameter patching, and the time when support is required to begin.
- b. S-band is to be used exclusively after TLI. MCC C-band and VHF coverage of the IU will be terminated within one or two hours after TLI.
- c. AOS/LOS times for each view period will not be included in the post-TLI SCM. Site release messages will contain AOS/LOS times for the station's next scheduled view period.
- d. Each station will acknowledge receipt of a post-TLI SCM in accordance with the SCM acknowledgement message.

Note

In addition to post-TLI SCM's, earth-orbital SCM's will be sent to stations having view of the spacecraft during the period from scheduled TLI to at least TLI plus 30 minutes. These messages will provide configuration information required in case of TLI cancellation or failure.

8.42.2 PRECEDENCE

SS.

8.42.3 ROUTING INDICATORS

Applicable station, GCTR, DSSW, HDYN, HNET, HSPO, and HOSC for station SCM's supporting the IU/CCS.

8.42.4 CLASSIFICATION

SCM.

8.42.5 EXAMPLE

SS GCTR DSSW HDYN HNET HSPO PHAW
DE HMSC 006
20/1305Z

SCM	HAW	ACK			
GET	SYS	VEH	MODE	LS	
00:90:00	1	CSM	6:02:02	X	
00:98:00	2	LM	6:02:00		

20/1306Z JUN 71 HMSC

8.42.6 TEXT EXPLANATION

- a. GET. The first vertical column will indicate the time (in hours, minutes, and seconds GET) the station is required to effect the configuration delineated in the remainder of SCM. If the mode represents a change to or from an uplink mode, the time in this column will be the carrier on or off time. The A/G voice will go remote or local to coincide with carrier on or off times.
- b. SYS. The second column designates the USB systems required. For single USB stations, the number 1 will appear in this column. For dual USB stations, either 1 or 2 will appear; if only 1 appears, the station may configure the second system at the station's discretion. For stations with 85-foot antennas, 1 and 2 represent prime station systems and 3 and 4 are wing station systems. If no number appears in this column, no support is required for that pass. The 210-foot antenna will be indicated by system 5. If dual vehicle support is required of a 210-foot antenna, system 5 will appear twice for the same support period.
- c. VEH. The third column designates the vehicle assigned to the USB system in column 2. The assignments are not made in order of priority; for example, if systems 1 and 2 are assigned to CSM and LM respectively and system 1 fails, the assignment for system 2 should not be changed to CSM unless directed.
- d. MODE. In the fourth column, three USB modes are designated. The first digit indicates the uplink mode, the next two digits indicate downlink PM mode, and the last two digits indicate downlink FM mode; "00" indicates the link is not required. All modes are described in Section 4 of the mission supplements. Both the numerical code (from column 4) and the vehicle (from column 3) are required to obtain the proper USB configuration. The FM mode for DSE dump is included in the SCM to notify the station of an MCC requirement to support the dump during that support period. The USB system to be used for receiving the dump is left to the discretion of the station M&O.
- e. LS. If low-speed tracking data is required, an X will appear in the fifth column.
- f. Note. This column will indicate if a note, found at the end of the message, applies to that view period.

8.43 SIMULATION MESSAGE

8.43.1 GENERAL

This message format may be used in support of simulations. It will never be used during the operational phase. The classification SIM directs that the message be delivered only to the simulations coordinator. During the simulation phase, the SIM message will take precedence over all other traffic except UU. Queries from M&O personnel regarding simulation instructions, either in terms of misunderstanding or apparent error content, will be separate messages.

8.43.2 PRECEDENCE

SS.

8.43.3 ROUTING INDICATOR

HSIM.

8.43.4 CLASSIFICATION

SIM.

8.43.5 EXAMPLE

SS HSIM
DE ACRO 044
18/1522Z

SIM
SIM QUE NR 3 NCG-741
WHAT SUNRISE/SUNSET TIME ARE TO BE USED IN A-G SCRIPT
FOR SECOND PASS

18/1523Z JUN 71 ACRO

8.43.6 TEXT EXPLANATION

Text is self-explanatory.

8.44 PAO RELEASE MESSAGE

8.44.1 GENERAL

This message is transmitted by the MSC Public Affairs Office to authorize stations to release mission information to the press.

8.44.2 PRECEDENCE

NN or RR.

8.44.3 ROUTING INDICATORS

As required.

8.44.4 CLASSIFICATION

PAO.

8.44.5 EXAMPLE

NN DSDC GCTR
DE HMSC 011
04/2042Z
FM PAO/AP3
TO ALL/OPSR

PAO
(FOLLOWING SUITABLE FOR PUBLIC RELEASE) APOLLO 16
PRELAUNCH PREPARATIONS CONTINUE ON SCHEDULE AT
CAPE KENNEDY WITH SPACECRAFT AND LAUNCH VEHICLE
CLEAR FOR AN APRIL 16 LAUNCH. MISSION OFFICIALS
MEETING AT THE KENNEDY SPACE CENTER (KSC) YESTERDAY,
APRIL 3, GAVE A GO-AHEAD FOR THE APOLLO FLIGHT AFTER
REVIEWING THE MISSION STATUS IN DETAIL. TECHNICIANS AT
KSC ARE COMPLETING LOADING OF HYPERGOLIC PROPELLANTS
ABOARD THE LAUNCH VEHICLE SECOND STAGE AUXILIARY
PROPULSION SYSTEM. LOADING OF RP-1 FUEL ABOARD THE
S-1B FIRST STAGE IS SCHEDULED FOR SATURDAY, APRIL 5
AND THE PRE-COUNT, A FINAL SYSTEMS CHECK, WILL BEGIN
APRIL 6 AT 1800 GMT (1400 A.M. CST). FLIGHT CONTROLLERS
AT THE MANNED SPACECRAFT CENTER TODAY (APRIL 4)
CONDUCTED RE-ENTRY SIMULATIONS WITH APOLLO 16 PRIME
AND BACKUP CREWS PARTICIPATING FROM THE APOLLO
COMMAND MODULE SIMULATOR AT KSC. A FINAL SIMULATION
WILL BE CONDUCTED MONDAY INVOLVING THE WORLD-WIDE
TRACKING, DATA AND COMMUNICATIONS NETWORK.

04/2051Z APR 72 HMSC

8.44.6 TEXT EXPLANATION

Text is self-explanatory.

8.45 MISSION CONTINGENCY PLAN MESSAGE

8.45.1 PRECEDENCE

UU

8.45.2 ROUTING INDICATORS

As required

8.45.3 CLASSIFICATION

URGENT

8.45.4 EXAMPLE

UU (as required)

DE GCEN 013

URGENT

18/2152Z

FM ND

TO ALL/STADIR OPSR

U R G E N T ! ! ! ! !

SUBJ: MISSION SIC NR. CONTINGENCY PLAN

1. THE MISSION CONTINGENCY PLAN IS IN EFFECT
AS OF (date) (time) (: : GET or T minus time).

ALL REAL TIME RECORDINGS OF TELEMETRY DATA, PLOTBOARD
CHARTS, TRAJECTORY DATA, RECORDINGS, WEATHER REPORTS,
OPERATOR'S LOGS, RADAR TAPES, COMMAND RECORDINGS &
HISTORIES, ACQUISITION AID DATA, SIGNAL STRENGTH RECORDINGS,
PHOTOGRAPHS ETC., FROM THE PERIOD (date: time) (: : GET or T
minus time) TO (: : GET or T minus time) ARE TO BE CONSIDERED AS
OFFICIAL INFORMATION AND HANDLED ACCORDINGLY.

2. STATION WILL NOT MAKE RELEASES, STATEMENTS, OR RELEASE
ANY DATA WITHOUT PRIOR APPROVAL FROM THE NETWORK DIRECTOR.

3. INSTRUCTIONS ON DISPOSITION OF DATA WILL BE SENT TO THE
STATIONS BY THE NETWORK DIRECTOR AS SOON AS THEY ARE AVAILABLE.

18/2154Z JUN 71 GCEN

8.45.5 TEXT EXPLANATION

Text is self-explanatory.

SECTION 9. DATA HANDLING

9.1 GENERAL

All recorded mission data will be identified, annotated, labeled, packaged, and shipped in accordance with this NOP, except as noted in the mission supplements. The term "mission data" is defined as data received and recorded from the space-craft, launch vehicle, and any component associated with the launch system and/or ground system instrumentation. All mission data recorded is the responsibility of NASA/GSFC, and will be administered and controlled as defined in the NOP and mission supplements.

9.2 AIRLINE DETECTION DEVICES AFFECTING DATA SHIPMENTS

9.2.1 AOCC

The AOCC will be responsible for making the necessary local arrangements with airline and postal authorities for either hand-carried or expedited shipments. This is to ensure that data is not damaged due to various inspection detection systems used by airline and postal authorities. The following are recommended guidelines:

- a. Assist in the movement and inspection of any recorded data.
- b. If practical, obtain certificate or certification from local authorities indicating visual inspection was made and packages are considered safe and acceptable. A copy of these certifications will accompany packages to indicate to intermediate authorities that inspection was performed at point of origin.
- c. Assist in tagging data, or implementing any procedure required locally to ensure that under no conditions will these data shipments be passed through magnetic radiation or detection devices.
- d. Ensure all packages are labeled:

SCIENTIFIC DATA RECORDING
PLEASE HANDLE CAREFULLY
KEEP AWAY FROM HEAT
AND ELECTRICAL EQUIPMENT

or use general use label 530-49 which is available from GSFC Code 823.

9.2.2 GSFC

GSFC Code 861.1 will perform the necessary coordination for the above precautions at the terminal airports and intermediate points once a shipment is enroute.

9.3 DATA IDENTIFICATION

Data originated by ARIA consists of magnetic tapes (telemetry and USB data), voice communications, timing signals, and pertinent operator's logs. Formats for recording data will be documented in the mission supplements. The ARIA may use the internal ETR data labeling and annotation procedures except that the DSS ID No. will be noted on each label. Table 9-1 shows data which may be required from the ARIA for an Apollo mission.

9.4 DATA DISPOSITION

GSFC Code 861.1 will provide copies of data to all authorized requesters. All original data will be filed in the GSFC Apollo data archives.

9.5 REQUIRED TELETYPE REPORTS

9.5.1 RECORDED DATA REPORT MESSAGE

Recorded Data Report messages will be sent in accordance with the instructions in the NOP supplements for each mission.

9.5.2 DATA SHIPMENT ADVISORY MESSAGE

As soon as possible, and not more than 3 hours after a data shipment is turned over to a carrier, ARIA-AOCC will send a Data Shipment Advisory message to GSFC Code 861.1 regardless of the distribution of a shipment. Refer to the applicable Apollo mission supplements for instructions.

9.6 STATION INVENTORY OF MAGNETIC TAPE

ARIA is exempt from submitting the monthly inventory of magnetic tape stock (Form STDN No. 2110).

Table 9-1. Sample ARIA Data Requirements

<div>Facilities</div> <div>DSS ID No. and Systems Data Listing</div>	ARIA 1-4	AOCC
<u>Premission Data</u> 890 inst almanac		X
<u>Mission Data</u> *330 comm A-G mag tape *630 USB mag tape rcdr 1 *631 USB mag tape rcdr 2 *632 USB mag tape rcdr 1/2 648 grnd to ARIA mag tape 881 status report (Mission Test Report) 882 AFETR form 40/six sheets	X X X X X X	 TTY
<u>Post Mission</u> 892 controller's report		X
*Specific DSS ID No. will be assigned in the appropriate mission supplement.		

SECTION 10. INFORMATION SYSTEM COMPUTER SUPPORT

10.1 ETR AOCC INFORMATION SYSTEM

10.1.1 ARIA ORBITAL ACQUISITION

The AOCC-IS will generate the ARIA Instrumentation Almanacs and will update the various AOCC displays, as required, based on the best mission data available. The mission data to be used will consist of updated MCC-RTCC IRV's and Apollo maneuver information messages. The AOCC computer advisor (call sign: ARIA Computer) will be the contact at the AOCC for ETR interface. Voice coordination between the two computer positions will be done on the GOSS-6 loop. The format for the ARIA Instrumentation Almanac is described in Section 1.

10.1.2 ARIA REENTRY ACQUISITION.

An update of reentry parameters in the ARIA reentry format will be transmitted via teletype, priority precedence, from MCC for use by the AOCC-IS approximately 24 hours and 5 hours prior to reentry. Additional reentry parameters may be required by the AOCC for advance ARIA planning and positioning prior to the reentry phase of the mission. All queries regarding the reentry messages will be referred to the MCC Track on the IP computer coordination loop, and the ARIA Computer/AOCC. The format for the ARIA reentry messages is described in section 8.

10.2 COMPUTER MESSAGES

10.2.1 APOLLO MANEUVER INFORMATION MESSAGE.

This message is transmitted by MCC to GSFC and ETR for Apollo maneuvers. It will be used to update the GRTS and AOCC-IS with orbital data changes. Refer to section 8 for the message format.

10.2.2 ARIA REENTRY MESSAGE.

The ARIA reentry message is transmitted to the AOCC-IS at entry interface minus 24 hours for ARIA TSP planning. Updates are transmitted at entry interface minus 5 hours (and entry interface minus 90 minutes, if required) to facilitate AOCC-IS generation of ARIA acquisition messages.